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Embedded COMPUTING DESIGN

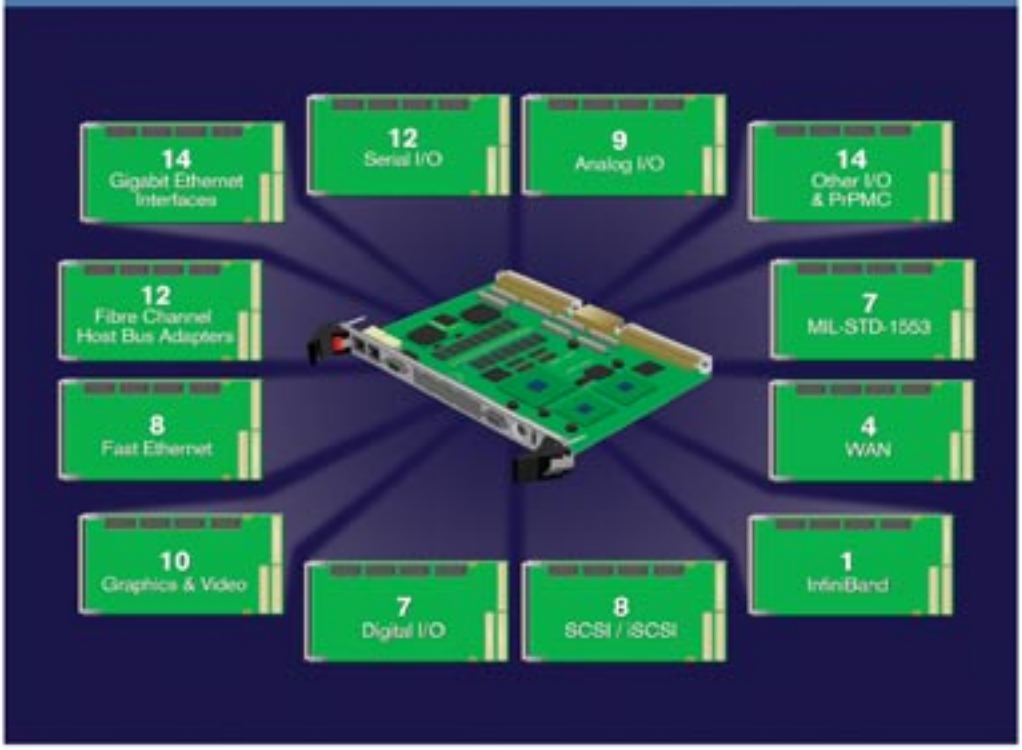
www.embedded-computing.com Vol. 2 No. 4

2004 Embedded Industry

Product Review

COTS solutions, Developer solutions, Electronic packaging, Network solutions, Research and instrumentation, Signal processing, Software and development, Storage solutions

106 PMC Modules and Counting.



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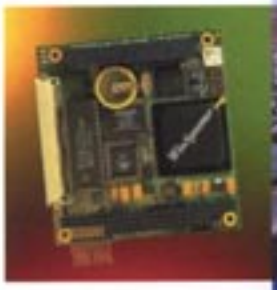

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Welcome to the second annual *Embedded Computing Design* catalog – the *2004 Embedded Industry Product Review*. Inside you will find a variety of embedded products suitable for meeting all of your system and embedded device needs. We've grouped the products into major categories offering developer, network, COTS, electronic packaging, research and instrumentation, software, signal processing, and storage solutions. *Embedded Industry Product Review* is your complete resource.

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Advanced managed platforms:
Solving mission impossible

By Tony Romero, Performance Technologies

You've heard some variation of the joke, "An Italian, German, and American walk into a room.…" Well, typically the joke goes on to discuss the incompatibility of these various people and their incapacity to view a situation in the same way. If you're forming an elite team to perform a *mission impossible,* you need people who are at the top of their specialty, who function as a team in-synch with the other members and who are flexible to respond to any situation. Such a team is highly advanced and highly managed. This is the premise behind advanced managed platforms. Generic platforms are the fundamental hardware and low-level software components integrated together to provide the basis to support your specific applications and services. For example, they include a chassis (with power and backplane), standards-based Ethernet fabric switches, and system management. In contrast, advanced managed platforms employ a comprehensive management architecture and a suite of highly compatible and feature-rich components that deliver high availability, *ready-for-application* platforms for equipment manufacturers developing communications, military, and commercial products.

If you are kicking off a new embedded application or upgrading an existing application, the *mission impossible* is to develop your application with a premium and competitive feature-set, cost effective and deliverable on a tight schedule. The platform you choose has a major affect on the success of your product. Standards-based components make sense because there is no budget, no resources, and no time for *reinventing the wheel* for proprietary architectures. Products based on the CompactPCI specification are widely available, well proven from years of development, cost-effective due to volume economies of scale, and have the support of numerous vendors.

Overall, embedded applications are complex and require a thorough investigation as to where you will obtain the platform to support your specific application. You might ask: What's the difference between a basic platform and an advanced managed platform? How will this save me money in development costs, test costs, deployment costs, and total cost of ownership? In addition, how will this position me ahead of my competitors? This article answers these and other such questions.

Sample applications

- Communications – wireless:
  - 3G
  - SGSN/GGSN
  - Wireless base station controller
- Communications – wireline:
  - Voice over IP
  - Media gateway
  - Softswitch
  - Interactive voice response
  - Signaling
  - Signaling gateway
  - Internet services
  - Streaming media
  - Conferencing systems
- Commercial:
  - High-availability server clusters
  - Media streaming
  - Financial transactions
  - Billing systems
  - Security systems
- Military:
  - Control systems
  - Secure communications
  - Test systems

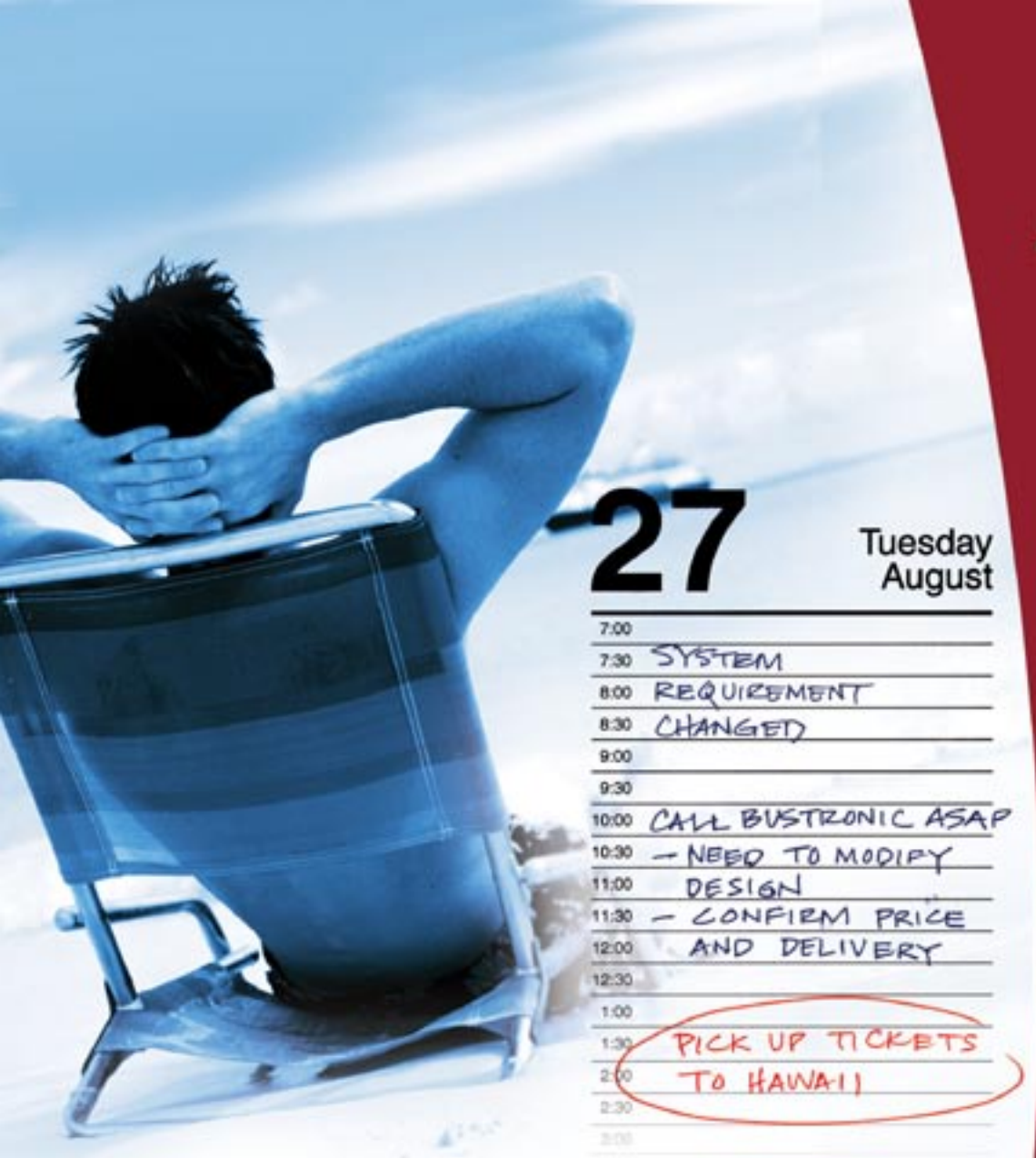
What is an advanced managed platform?

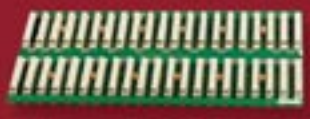
Consider you are ready to form your top-notch team of experts to carry out your mission; in this case, the platform components necessary to architect your embedded application. The following examples illustrate the differences between disparate groupings, simple groupings, and advanced groupings.

Disparate groupings

You want the best in each field, so you hire the Italian, the German, and the American – each of whom are experts in their own field. However, in the example of a disparate grouping, these people have never worked together nor have they been trained together. Can you trust that they can accomplish the mission as a team? There could be compatibility issues where the team members can't get along. Can you afford the time to train them and sort out these issues?

"…the mission impossible is to develop your application with a premium and competitive feature-set, cost effective and deliverable on a tight schedule."





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Even with the suite of PICMG 2.X specifications defining standards-based interfaces for CompactPCI, components are still complex. Building a platform from disparate components from multiple vendors requires compatibility testing, integration research and development, and time spent dealing with multiple tech support groups (who most likely will point compatibility problems to another vendor's component). This scenario, as depicted in Figure 1, places your mission at risk for time-to-market readiness, compatibility headaches, and a lot of integration work.

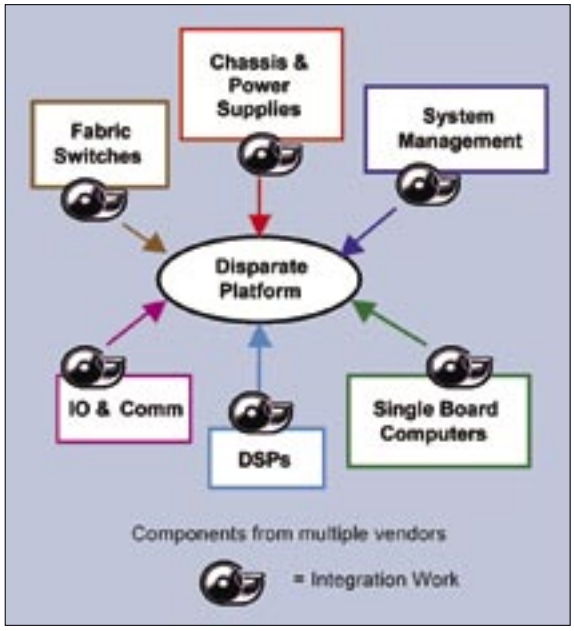

Figure 1

Simple groupings

You think about the above and realize that you prefer to go with a team that has worked together in the past, i.e., a simple grouping. You find a team who has worked together but realize they are a loose amalgamation, referenced together from time to time as jobs arise. They may have worked together in the past for one specific task but are not constantly managed or trained by one organization.

Some CompactPCI vendors have developed multiple components to operate with each other. Simple interoperability includes basic data and/or control communication between components (see Figure 2). It may include basic system management information such as health status and power up/down control. In addition, a simple platform vendor may depend on OEMing several components from other companies, which limits their capability to affect feature changes and limits their capability to support the product.

Advanced groupings

You look further into teams that have worked together and discover the *dream team.* This advanced grouping has been trained to be the top of their field, has undergone advanced training to work well together, and is flexible to perform various tasks. In addition, they all work for the same employer, so they are well managed and perform efficiently and in unison.

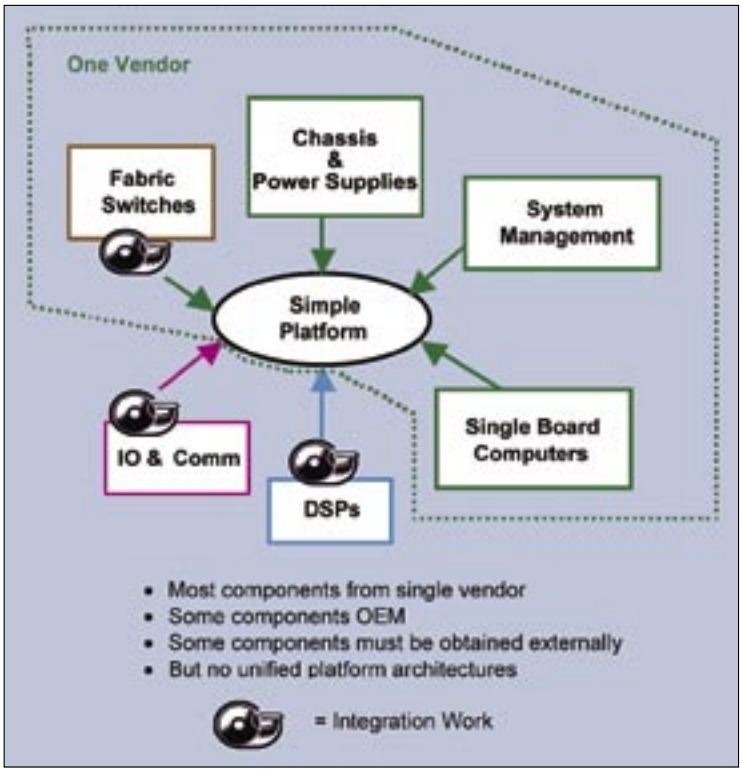

Figure 2

In an embedded application, the critical components and supporting software necessary include the chassis with backplane, PICMG 2.16 Ethernet switches, PICMG 2.9 intelligent shelf management, single board computers, I/O and communication cards, voice and fax media packet processors, and SS7/IP solutions. The PICMG 2.16 specification helps to reduce compatibility issues as independent boards in a platform can simply communicate over TCP/IP over the backplane for data and control. However, even with PICMG 2.16 applications, unified and advanced platform architecture is still critical to ensure compatibility.

The chassis must be able to power and cool each board properly in maximum load and extreme temperature conditions. The backplane must be designed in concert with the fabric switch to support the Ethernet fabric signals to each slot. In addition, even though the PICMG 2.9 specification calls out a standard interface and a standard command set, there are other architectural issues to consider, such as reliability and security. By implementing a star topology with a point-to-point interface from each managed component to the intelligent shelf manager, any rogue components will be isolated and will not be able to control other components in the platform.

Each component in a platform supporting IPMI contains a microcontroller that provides information back to the intelligent shelf manager. Components in a platform can support data sensors that gather information such as health, temperature, voltage, current, and FRU information. In an advanced managed platform, not only are all components IPMI-supported with a comprehensive data sensor set, but also the sensors themselves all report the same data from the same microcontroller, therefore unifying the data gathered from all components and simplifying shelf management.

The anatomy of advanced managed platforms

Equipment manufacturers who design with advanced managed platforms

reduce their costs for research, test, design, and integration activities, as well as the end customers' who deploy and service the equipment. In addition, as deployed systems have new components installed or replaced, maintaining compatibility eliminates new integration issues.

High availability

High availability (HA) is a fundamental requirement for business- or mission-critical embedded applications. Equipment manufacturers are also becoming more sensitive to minimizing total cost of ownership to their end customers. High-availability architectures are intended for always-on solutions, which reduce operational expenses and revenue opportunity losses caused by service interruptions. In addition, these applications can be designed cost-effectively to also reduce capital expenditures.

Fault-tolerance

A fault-tolerant system is one designed such that in the event a component fails, a backup component can immediately take its place with no loss of service. When using an Ethernet network to detect a failure in a component, the failover process can take seconds. A heart-beating watchdog will query the component several times to determine if it is nonfunctional. However, with an IPMI controller on each redundant component, failover procedures begin immediately. In addition, the IPMI controller can cause a proactive failover before an actual failure. In such a scenario, the first device can synchronize its configuration data and last transaction data to the other device before shutting down or resetting.

Intelligent shelf management

Comprehensive shelf management has quickly become a required feature in embedded applications, as it helps to increase high availability beyond the *five-nines* of availability. We define shelf management as the monitoring and control of active components within the platform. System or enterprise management is defined as the higher-level management system that monitors and manages all the platforms and other equipment from the operations center. The shelf management for each platform integrates to the enterprise management software.

"High-availability architectures are intended for always-on solutions, which reduce operational expenses and revenue opportunity losses caused by service interruptions. ...these applications can be designed cost-effectively to also reduce capital expenditures."

In the past, simple platforms gathered only power and fail information. With an advanced managed platform, beyond just simple health status and slot control, a centralized shelf management card gathers a comprehensive set of sensor data such as temperature, voltage, current, and FRU information from each managed component. By implementing policy-based actions and setting thresholds or event filters, a system manager can monitor, predict, and react to failures before an occurrence, hence increasing high availability.

The intelligent shelf manager (ISM) is designed from the ground up for advanced managed platforms based on the PICMG 2.16 architecture, where there is a strong focus on a dynamic population of components and maximum service availability. This architecture is also very portable to new AdvancedTCA specifications. The IPMI specification provides a solid foundation for the management of such platforms.

Plan thoroughly for best results

As you embark on your *mission impossible,* consider all the feature requirements for your application, and consider how advanced managed platforms create a solid foundation.

Requirements include:

- Reduced total cost of development
- Rapid development cycle
- Reduced vendor set
- Reduced compatibility and integration issues
- High availability
- Redundant components
- Fault tolerance
- Comprehensive shelf management
- Feature complete and compatible components
- Flexibility to meet your specific requirements
- High performance components to suit your application today and in the future as it scales
- Serviceability and deployment to reduce your customers' total cost of ownership
- Density to reduce real estate costs and provide scalability

Advanced managed platforms gain strength from the PICMG 2.16 and 2.9 standards and provide equipment manufacturers and system integrators the basis to go beyond five-nines availability while handling the high-performance computing requirements of next-generation, packet-based systems.

Tony Romero *is a senior product manager with Performance Technologies. For the past three years, Tony has worked extensively in system architecture and product development of platforms with CompactPCI Packet Switched Backplanes, both pre-PICMG 2.16 and PICMG 2.16. His responsibilities include managing the CompactPCI computing platform products that comprise chassis, midplanes, system management, power supplies, and cooling.*

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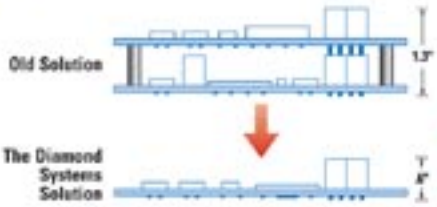

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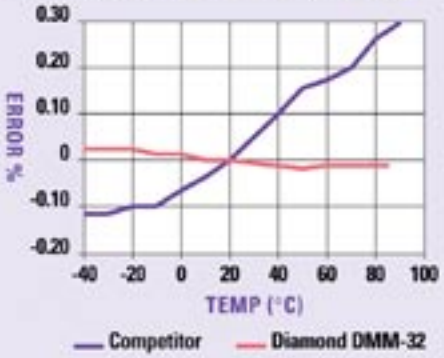

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MBA is available as a boot ROM chip for network adapters, as a binary file for integration into a system BIOS for LAN-on-motherboard implementations, or as a bootable floppy disk or CD. There's a version for most popular LAN Controller Chips, including those from 3Com, Broadcom, Intel, Realtek, AMD, National Semiconductor, DEC, SMC, VIA and others.

What can you do with MBA?

MBA and network booting add another tool to the system administrator's toolbox, helping reduce the Total Cost of Ownership associated with managing today's embedded clients and devices. With network booting, you can deploy from a central location, client device maintenance and management utilities such as remote OS and application deployment, virus scanning, critical file backup and recovery, BIOS flash upgrades, and more. You can also boot diskless systems such as thin clients and embedded systems.

ARGON™ TECHNOLOGY

www.ArgonTechnology.com

The World's Choice for Network Booting Solutions.

Argon Technology Corporation - the network booting experts

Our engineering and support staff have years of experience helping OEM customers to integrate MBA into their solution, and helping system administrators set up and leverage network booting. Our extensive test labs and procedures ensure that MBA is robust and compatible with popular client management products.

For more information call:
Toll: 866-ARGON-55 | Tel: +1.905.673.9978 | Fax: +1.905.673.9013
or email: info@ArgonTechnology.com

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COTS for MIL-STD applications:
Leveraging technology

By John Gerngross, Condor Engineering

Chasing size down the curve

The military avionics market has seen MIL-STD-1553 test, simulation, and deployed implementations scale from huge DEC Unibus cards to 19" rack-mount boxes to smaller, more integrated multichannel backplane cards. These implementations targeted systems such as VME and PCI, and today, target very small and highly integrated PCMCIA interfaces as well.

With the evolution of ASIC technology, specialized 1553 chip manufacturers further reduced the size of their implementations from discrete protocol and transceiver chipsets to single, low-profile and low-power ASICs.

However, it is Field-Programmable Gate Array (FPGA) core-based implementations that have made the biggest impact recently in today's avionics designs. The shift from 1553 ASIC designs to FPGA technology enabled the military to leverage state-of-the-art technology to address a number of design problems, including power consumption, weight, system real estate, and parts obsolescence management.

The emergence of COTS solutions

Commercial off-the-shelf (COTS) subsystems and components have made major in-roads into existing and planned weapons, communications, and military transport solutions. COTS solutions provide designers with easy access to products, the ability to respond quickly to feature requests, overall cost reduction, and the ability to leverage commercial technologies. These are all sound reasons to select a COTS solution for a military application.

The need for COTS in military avionics applications is obvious – cost control is paramount, development time must be minimized, and flexibility is desirable for future upgrades and interfacing with other subsystems.

All of which is easy to say, but leaves military designers with a few major issues that COTS vendors have sought to address:

- Obsolescence of parts
- The viability of open-system architectures
- Whether the required degree of ruggedness can be achieved

The commercial sector tackles the issues

COTS vendors have faced the need to respond to three major concerns of military avionics design engineers: obsolescence, integration, and durability.

Obsolescence is a major risk for all multi-year electronics production projects. Core-based intellectual property implementations for FPGA designs have proven to be an extremely viable response to this issue. Cores are predefined and tested functions that can be dropped into an FPGA design. The tremendous capability and capacity of modern FPGAs makes them ideal for 1553 designs. The result is smaller systems – meaning reduced footprint and weight, lower power consumption, higher reliability, and lower cost.

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Most importantly, FPGAs with an IP core dramatically mitigate parts obsolescence because designers are not tied to one specific part, or even a single FPGA manufacturer. Contrast this with sole-source, specialized protocol ASICs and processors, which can be discontinued at any time.

There is another subtle, but just as important, second-order benefit of this approach. Core implementations greatly reduce design risk by providing the ability to reprogram the hardware in the field. When system requirements are changed or bugs need to be fixed, an FPGA-based design can be updated under software control.

What about integration considerations? Designers look for maximum flexibility so that they can easily integrate the core module into their design environment and test system architecture. COTS vendors have responded to this need with an array of software tools coupled with knowledgeable technical support.

At Condor, we offer extensive, high-level, API (Application Programming Interface) libraries that speed application development, and provide support for Windows XP, 2000, NT, Me, 98, 95, Linux, VxWorks, Solaris, LynxOS, LabVIEW, Lab Windows/CVI, and Visual Basic. We also provide integrated application packages that deliver comprehensive, advanced test and simulation solutions to further simplify integration.

Durability, however, is the deal-breaker for many systems. Military applications demand ruggedized systems that can withstand the heat and vibration associated with residing onboard aircraft and missile systems. Ruggedized products use industrial temperature grade parts and design techniques that take into account both sine and random vibration and shock. Condor markets ruggedized 1553 databus products for the CompactPCI, PMC, VME, and PC/104 platforms. These can withstand an extended operating temperature range of –40ºC to +71ºC (typical maximum cold rail temperatures for conduction-cooled systems), and answer reliability and operational longevity issues with MTBF values well over 75,000 hours.

Today's COTS board offerings, such as single board computers, specialty processing and I/O, avionics databuses and chassis, offer a wide functional selection for board level solutions. Intellectual property core FPGA products expand the design choices and allow in-field programmability while providing better parts obsolescence management for long duration programs. Condor's card level and CORE-1553 products provide the avionics designer many choices of design and program management for rugged aerospace projects. For the military avionics design engineer, it can today be truly said that COTS solutions offer enormous choice coupled with flexibility and, best of all, low risk.

John Gerngross *founded Condor Engineering in 1989. Before establishing Condor, he had more than twenty years of engineering experience at Raytheon, Delco Electronics, and other aerospace companies in California and Massachusetts. John received a bachelor's degree in mathematics and a master's degree in electrical and computer engineering.*

Condor *is an innovative leader in the avionics industry, providing interface hardware, software, tools, and support for embedded, test, and simulation applications. For more details, visit* www.condoreng.com.

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MIL-STD

Q104-1553

FEATURES:

- One, two, or four dual-redundant MIL-STD-1553A/B interfaces
- Multifunction (simultaneous BC, 31 RTs, and BM) and single-function (BC or 31 RTs or BM) versions
- High-level 1553 API for Windows XP, 2000, Me, NT, 98, 95, Red Hat Linux, Solaris, and additional O/S
- 1 MB RAM per channel, I/O triggering and error injection/detection, and aperiodic message insertion
- High-density PC/104-*Plus* interface available
- Conditional BC branching on real-time message data or status

CONDOR ENGINEERING

www.condoreng.com

Condor's Q104-1553 and Q104-1553-P boards provide new levels of performance and flexibility for MIL-STD-1553A/B Notice II in the PC/104 (ISA backplane) and PC/104-*Plus* (PCI backplane) form factors. Available in commercial and extended temperatures, ruggedized versions with one, two, or four dual-redundant channels, the Q104-1553 includes advanced Application Programming Interface (API) software that reduces application development time. Standard features include 1 MB of RAM per channel, 45-bit message time-tagging, triggers, extensive BC and RT link-list structures, error detection/injection, transformer coupling, automatic/manual RT status bit and mode code responses, and much more.

Condor Engineering, Inc.
101 West Anapamu Street
Santa Barbara, CA 93101
Tel: 805-965-8000 • Fax: 805-963-9630

For more information, contact sales@condoreng.com.

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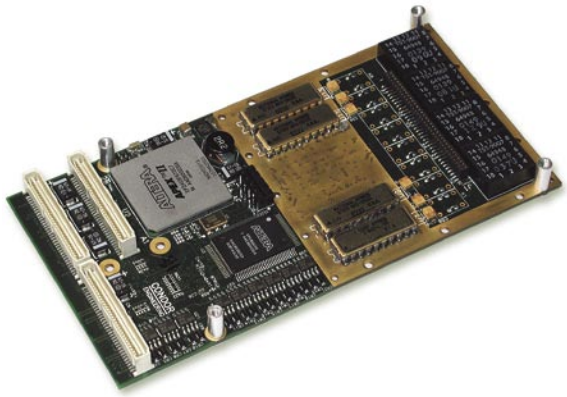
MIL-STD



QPMC-1553

FEATURES:

- One, two, or four dual-redundant channels for MIL-STD-1553A and B Notice II
- Simultaneous bus controller, 31 remote terminals, and bus monitor
- High-level API for Windows XP, 2000, Me, NT, 98, 95, Red Hat Linux, and VxWorks included
- Compliant to some of the most rugged environmental conditions of MIL-STD-810
- 1 MB RAM per channel, 45-bit microsecond time-tagging, and flexible message status/interrupt generation
- Optional extended temperature range, variable voltage output, conductive cooling, and 66-MHz PCI bus operation

CONDOR ENGINEERING

www.condoreng.com

The QPMC-1553 provides the highest level of performance, flexibility, and interface density for MIL-STD-1553A/B on the PMC bus (PCI mezzanine card). The QPMC-1553 is integrated with powerful software that reduces development time. Our advanced Application Programming Interface (API) supports all 1553 data-bus functionality. Standard features include IRIG/GPS synchronization capability, real-time bus playback, with ability to edit out RTs, aperiodic message insertion, error injection/detection, conditional BC branching, 45-bit time tags, and "one-shot" BC operation. The bus monitor mode provides 100 percent bus monitoring of a fully loaded 1553 bus.

Condor Engineering, Inc.
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Tel: 805-965-8000 • Fax: 805-963-9630

For more information, contact sales@condoreng.com.

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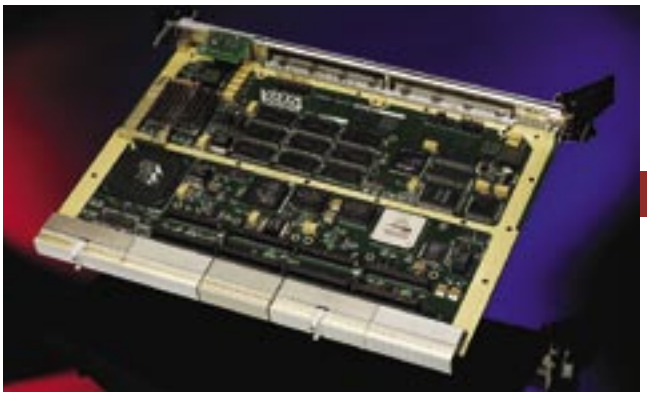
MIL-STD



G4C – cPCI SBC

FEATURES:

- PowerPC 7457 with AltiVec RISC processor based SBC with dual, onboard PICMG 2.16 1000Base-T (GbE) Ethernet ports
- Standard 6U x 160mm module with 64-bit CompactPCI interface and PICMG standard I/O pin-out compatibility
- Maximum-data-flow rate made possible by large, onboard, dual-ported packet memory tied to dual GigE ports
- 2 MB of external L3 SBSRAM cache, from 512 MB to 1 GB of onboard SDRAM
- 64 KB of NOVRAM and 128 MB of program Flash with write-protected boot area and onboard programming
- Extended-temperature, rugged air- or conduction-cooled versions for the most demanding mission-critical applications

CURTISS WRIGHT Controls, Inc. Embedded Computing

www.VISTAcontrols.com

Grabbing and storing TCP data packets is one of the largest consumption processes of MIPS. The packet memory enables the CPU to concentrate on an application's real-time issues and process the data as needed by the application. Besides its Ethernet ports, the PPC G4C provides dual PMC sites. The PowerPC 7457 answers the call from systems designers for high-speed, high-power performance, i.e., 1 GHz. Plus, the new SBC offers dual 64-bit/66-MHz PMC sites with 3.3V and 5V universal I/O choices, signal level integrity, and high PMC bandwidth for numerous high-speed I/O and onboard resource expansion via differential protocols, including FibreChannel, ATM, or other high-speed, LVDS serial fabrics.

Curtiss-Wright Controls Embedded Computing Subsystems
28965 Avenue Penn
Santa Clarita, CA 91355
Tel: 661-257-4430 • Fax: 661-257-4782

For more information, contact sales@VISTAcontrols.com.

RSC #**1601** @ www.embedded-computing.com/catalogrsc

MIL-STD

P3A – VMEbus SBC

FEATURES:

- Socket 370 Pentium III high-speed microprocessor up to 1.0 GHz, 133-MHz system bus and PC266 memory bus
- Meets the FBCB2 Common Card program's stringent hardware and software requirements
- Optimized for "Wintel-based" (Windows/Intel processor) client/server file systems
- Boot FLASH drive on a secondary IDE up to 1 GB; 256 KB of L2 cache and 512 MB of DDR SDRAM with ECC
- AGP mezzanine with SVGA graphics controller, 4 MB of display cache, and CRT and LVDS flat-panel graphics interface
- Extended-temperature, rugged air- or conduction-cooled versions for the most demanding mission-critical applications

CURTISS WRIGHT Controls, Inc. Embedded Computing

www.VISTAcontrols.com

VCP P3A features are ideal for FBCB2 and for other demanding applications – from Wintel-based client/server file systems, man-machine interfaces and embedded simulation and training, to C4ISR. Additional resources include two USB 2.0 ports, six high-speed 16550 and two 85C30 compatible serial ports; 10/100Base-TX and SCSI-2 single-ended 8/16-bit interfaces. The VCP P3A has a high-speed interrupt controller, three 16-bit and one 24/32-bit programmable timers, a watchdog timer, and real-time clock. It also features PS/2 compatible keyboard, mouse, and audio I/O ports. The VCP P3A's PMC mezzanine site is equipped to handle 3.3V and 5V signaling facilitating system customization.

Curtiss-Wright Controls Embedded Computing Subsystems
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For more information, contact sales@VISTAcontrols.com.

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MIL-STD

Quantum3D® THERMITE™

FEATURES:

- Supports Linux and Microsoft Windows XP
- Lightweight, sealed alloy case with MIL-SPEC connectors
- 1-GHz Transmeta CPU, 512 MB DDR and shock resistant drives
- Advanced power management with BA5590 support
- NVIDIA mobile 2D/3D graphics (64 MB) with video I/O
- Comprehensive I/O options

Quantum3D

www.quantum3d.com

THERMITE is the first Tactical Visual Computer designed for man-wearable and vehicle-based embedded training, mission planning and rehearsal, and for deployed C4ISR applications where the combination of PC-compatibility, small size, long battery life, and high-performance is essential. Built for operation in hostile environments, THERMITE employs a lightweight, sealed alloy case, Transmeta® 1-GHz CPU, 512-MB DDR memory, solid state or shock resistant drives, NVIDIA® GeForce™FX Go GPU with advanced video capture and display support, advanced power management, and comprehensive I/O capabilities – all of which enable THERMITE to deliver workstation performance right to the battlefield.

Quantum3D, Inc.
6330 San Ignacio Avenue
San Jose, CA 95119
Tel: 407-737-8800 x100 • Fax: 407-737-8801

For more information, contact salesinfo@quantum3d.com. RSC #1701 @ www.embedded-computing.com/catalogrsc

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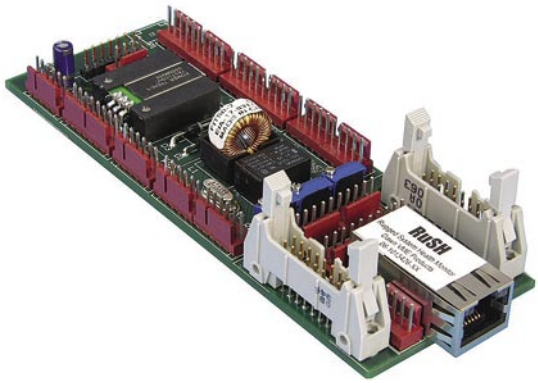

Model 426

FEATURES:

- Monitors chassis temperature, fan operation, and power-supply DC outputs
- Onboard RS-232 and 10/100Base-T ports with its own IP
- Menu driven device parameter setup
- Two levels of password security
- E-mail client sends three messages in the event of failure condition
- Polymeric LED display standard

Dawn VME Products®

www.dawnvme.com

With Dawn's RuSH™ μP technology, Model 426 is a programmable, bus-independent embedded board designed to monitor, control, and communicate chassis environmental parameters. Monitored/controlled parameters include chassis temperature, fan speed, output voltages, and digital/analog peripherals connected directly to Model 426's I/O ports. Multiple communication ports enable users to access Model 426 via RS-232 or the Internet. Device parameter setup is as easy as accepting Dawn's default parameter values or typing in new values. Two levels of password security are built into firmware that the user may administer locally or remotely. Dawn offers Model 426 in its commercial and COTS chassis products.

Dawn VME Products
47915 Westinghouse Drive
Fremont, CA 94539
Tel: 510-657-4444 • Fax: 510-657-3274

For more information, contact jmarceca@dawnvme.com. RSC #1702 @ www.embedded-computing.com/catalogrsc

Lanner Electronics Inc.

EM-S300A CPU-based Mini Workstation

www.lanner-usa.com

FEATURES:

- Wall mountable mini-workstation
- Rugged construction for harsh environments
- Bundled with EM-354, an all-in-one embedded SBC
- 10/100Base-T and AC'97 audio
- Two COM ports, one parallel port, four USB ports, and one IrDA
- Reserved CompactFlash Type I/II socket
- One 2.5" HDD bay
- Intel ultra-low-voltage Celeron processor at 650 MHz or 400 MHz (fan-less) onboard
- VIA chipset integrated with AGP 4X graphics
- Supports 36 bits TFT/DSTN/STN LCD and two channels (2x18 bits) LVDS
- One ATA/100 IDE channel
- One built-in PC/104 expansion slot

EM-S300A Intel ULV Celeron CPU-based Mini Workstation with VGA/Audio/LAN/CF/USB

EM-S300A is an all-in-one embedded system powered by an Intel ULV 400-MHz CPU SBC and an external DC power adapter. Designed for harsh industrial environments, this mini-workstation features one Ethernet, two COM, four USB, and one parallel port. Its VGA core includes an S3 ProSavage 4 chip that supports AGP 4x graphics. The EM-S300A system memory has a maximum capacity of 512 MB SDRAM, with an 8-MB, 16-MB, or 32-MB shared memory for VRAM and AC 97 Codec use. Audio functions are made possible via the mic-in, line-in, and line-out ports on the rear panel. An IDE interface that supports ATA-100 is likewise available. For mobile computing purposes, the reserved CompactFlash socket in the EM-S300A can support ATA mode (Type I/II) and IBM Microdrives from 170 MB to 4 GB. In addition to these features, the EMS-300A can boot from either CompactFlash or an IBM Microdrive, and the optional Windows CE .NET 4.2 can extremely reduce development schedules and accelerate time-to-market dates. With such multimedia flexibility and user-friendly characteristics, the EM-S300A from Lanner promises to fit a wide range of applications including gateways, security systems, POS, Internet, IA, firewalls, IP sharing, etc.

Lanner Electronics Inc.

925 Canada Court
City of Industry, CA 91748
Tel: 626-581-1898 • Fax: 626-581-1897
Toll free: 800-663-4797

For more information, contact sales@lanner-usa.com.

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PC-770 High performance embedded PIII

FEATURES:

- –40°C to +85°C operating range @ 400 MHz
- 800-MHz Pentium® III, or 400-MHz Celeron®
- SO-DIMM socket for up to 512 MB SDRAM
- Accepts PC/104 and PC/104-*Plus* cards
- 512-KB SMT Flash contains BIOS
- CompactFlash™ on primary IDE controller accepts Type I or Type II devices
- 18- or 24-bit TFT flat panel, DVO flat panel, or CRT with resolutions to 1600 x 1200
- Two 10/100Base–T ports
- Four USB ports, 1.1-compliant
- Four eight-wire serial ports
- Parallel port supports bidirectional, ECP, and EPP modes
- Dedicated digital I/O, 24 lines

Octagon Systems Corp.

6510 W. 91st Avenue
Westminster, CO 80031
Tel: 303-430-1500 • Fax: 303-426-8126

OCTAGON SYSTEMS CORP.

www.octagonsystems.com

The PC–770 SBC is a Single Board Computer (SBC) with a rich family of essential I/O functions. It integrates video, serial ports, parallel port, digital I/O, Ethernet, and USB networking into a single card. With a Pentium III® or Celeron® CPU, two Ethernet ports, and four USB ports, it is ideal as a command, control, and communications hub. The PC–770 is ideal for applications in transportation, security, military, communications, distributed control, point-of-sale, ticketing machines, weighing equipment, and similar applications. The onboard temperature sensor makes it suitable for situations where heat dissipation is a concern.

The PC-770 provides enough computing power for virtually any embedded application. It is fully compatible with most operating systems, and Octagon has developed OS Embedder™ kits with all the drivers you need to get up and running quickly. Octagon's PC-770 Linux OS Embedder kit features Linux 2.6.

The built-in functions on the PC-770 provide easy access to the enhanced features such as watchdog timer, read/write to serial EEPROM, temperature sensor, and user jumper. The PC-770 will withstand high shock and vibration, and operates in temperature ranges from –40°C to +85°C. We design and manufacture our products to the exact specifications of our quality management system, which is ISO 9001: 2000 certified. This rugged SBC will provide years of reliable service in the most challenging environments.

Octagon is your single hardware and software source. We provide free technical support, and our OS Embedder kits offer everything you need for fast, easy implementation of the operating system for your application. You can reduce the cost of development and time to market with Octagon's one-stop systems.

For more information, contact info@octagonsystems.com.

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New XE-800 EPIC mid-sized

FEATURES:

- AMD Geode GX1 CPU with CS5530A companion chip; 300 MHz clock speed
- Fully compatible with Windows CE .NET, Linux, QNX, and DOS
- Standard EIDE interface supports three devices
- Onboard video controller for CRT or TFT flat panels
- Dedicated digital I/O, 48 lines
- Two eight-wire serial ports
- Six USB ports; four 2.0-compliant and two 1.1-compliant
- PC/104 16-bit ISA bus and PC/104-*Plus* 32-bit PCI bus; accepts PC/104 and PC/104-*Plus* cards
- 10/100Base-T, supporting IEEE 802.3 standard
- Size: 4.5" x 6.5" x 0.8", EPIC™ form factor
- –40°C to +80°C operating range
- Power: 5V ± 0.25V @ 1.5 Amps typical (64 MB SDRAM)

Octagon Systems Corp.

6510 W. 91st Avenue
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Tel: 303-430-1500 • Fax: 303-426-8126

OCTAGON SYSTEMS CORP.

www.octagonsystems.com

The EPIC XE–800 is a high-performance Single Board Computer (SBC) with a rich family of essential I/O functions. EPIC offers a new mid-sized form factor for PC/104 and PC/104-*Plus* expansion. The XE–800 integrates video, serial ports, digital I/O, and networking into a single card. With a Pentium II compatible CPU, Ethernet, and six USB ports, it is ideal as a USB hub for command, control, and communications applications. The XE–800 is designed for applications in transportation, security, military, communications, distributed control, point-of-sale, ticketing machines, weighing equipment, and other similar projects. The low-power requirements make it suitable for situations where battery life or heat dissipation is a concern.

The XE–800 provides enough computing power for virtually any embedded application. It is fully compatible with Windows CE .NET, Linux, QNX, and DOS. As a one-stop hardware and software source, Octagon has developed OS Embedder™ kits with all the necessary drivers to get you up and running quickly. The Linux Embedder kit features Linux 2.6.

The built-in INT17 functions for DOS provide easy access to the enhanced features such as a watchdog timer, read/write to serial EEPROM, and user jumper. The XE–800 will withstand high shock and vibration and operates in temperature ranges from –40°C to +85°C. We design and manufacture our products to the exact specifications of our quality management system, which is ISO 9001: 2000 certified. This rugged SBC will provide years of reliable service in the most challenging environments.

Octagon is your single hardware and software source. We provide free technical support, and our OS Embedder kits offer everything you need for fast, easy implementation of the operating system for your application. You can reduce the cost of development and time to market with Octagon's one-stop systems.

For more information, contact info@octagonsystems.com. RSC #20 @ www.embedded-computing.com/catalogrsc

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CR3 CompactPCI SBC

FEATURES:

- Conduction-cooled
- Dual CompactFlash storage on a mezzanine card
- Real-time clock
- IEEE 1284 parallel port
- Watchdog timer
- Temperature monitoring capability

SBS Technologies

www.sbs.com

The CR3 is a CompactPCI single board computer driven by an Intel® Ultra Low Voltage (ULV) Celeron® processor in a conduction-cooled 3U form factor. The CR3 is designed for embedded applications using CompactPCI-based 32-bit architecture. The CR3 has an extended operation temperature range of –40°C/+85°C and extended shock and vibration tolerance. The CR3 is equipped with 128 MB of SDRAM and 512 KB of boot Flash, two RS-422 serial ports, two Fast Ethernet ports, a parallel port, a PS/2 keyboard/mouse port, and an optional dual CompactFlash® storage disk mounted on a daughtercard. The ULV Celeron processor core uses only +1.1V when operating at 650 MHz or 0.95V at 400 MHz.

SBS Technologies®
2400 Louisiana Blvd., NE
Albuquerque, NM 87110
Tel: 800-727-1553 • Fax: 505-875-0400

For more information, contact info@sbs.com.

RSC #2101 @ www.embedded-computing.com/catalogrsc

RUGGED

VR-9 6U VMEbus SBC

FEATURES:

- Ultra compact, one slot only or two slot with front panel I/O
- Flash drive up to 1 GB or local 2.5" hard disk
- Optional –40°C/+65°C
- Conduction cooling
- High shock and vibration immunity
- Custom specific, low-cost assembly versions

SBS Technologies

www.sbs.com

The VR9 is a 6U VMEbus, all-in-one CPU board with integrated low-power gigahertz processor speed and dual Gigabit Ethernet channels compliant to VITA 31.1-2003. Based on the Intel® Pentium® M processor (0.13 chip technology), the VR9 supports processors from 600 MHz up to 1.6 GHz. It offers low power consumption and eliminates the need for onboard ventilation. The VR9 provides up to 2 GB DDR SDRAM (200) with ECC, three independent onboard PCI buses, support for the VME64x backplane, two PMC interfaces (64-bit/66-MHz and 32-bit/33-MHz). Supported operating systems include Windows® 2000, Windows® XP, QNX, VxWorks®, LynxOS®, Linux®, and others.

SBS Technologies®
2400 Louisiana Blvd., NE
Albuquerque, NM 87110
Tel: 800-727-1553 • Fax: 505-875-0400

For more information, contact info@sbs.com.

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RUGGED

M623 ETX MODULE

FEATURES:

- CPU: VIA EDEN ESP 4000, 6000, 8000, and 10,000
- Up to 1024 DDR RAM on SO-DIMM socket
- Graphic controller: CLE266 with AGP 8X 2D/3D graph
- Dual display technology
- Two serial ports, four USB 2.0 ports, one parallel port
- Ethernet, audio, P/2 mouse and keyboard

SECO
NO LIMITS
EMBEDDED SOLUTIONS

www.seco.it

M623 is an ETX board based on the VIA EDEN processor available at 400, 600, 800 MHz, and 1 GHz. The module integrates the new VIA CLE266 chipset offering outstanding three-dimensional graphic performance. The Flash disk is soldered onboard so that the module can be used for applications operating in harsh environments. The M623 supports the dual display technology to manage two displays with different images. The board also integrates in a compact size the most common PC features: two serial ports, four USB 2.0, one parallel, EIDE interface, Ethernet, audio, and MPEG 2 decoder. The processor and chipset are optimized for low power consumption, enabling fanless application use.

SECO S.R.L.
via Calamandrei, 91
Arezzo, 52100 IT
Tel: +39 0575 26979 • Fax: +39 0575 350210

For more information, contact dlica@seco.it.

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RSC #22 @ www.embedded-computing.com/rsc

PowerNode3

THALES

www.thalescomputers.com

The PowerNode3 is a single/dual, 1-GHz PowerPC G4, high-end computing node featuring enhanced connectivity and reduced power consumption. PowerNode3 is designed for state-of-the-art applications requiring real-time data and signal processing, including sonar, radar, medical imaging, and machine vision systems.

The new PowerNode3 features dual and single Motorola PowerPC G4 7457 processors running at 1 GHz each, equipped with a 2-MB L3 cache and 2-MB private SRAM linked via a 133-MHz Avignon host bridge. Up to 1 GB onboard SDRAM is accessible at the local bus speed of 133 MHz. The new board provides two PCI Mezzanine Card (PMC) slots (one 64-bit 66-MHz and one 32-bit 33/43-MHz).

PowerNode3 is designed for connectivity, with an ALMA2e VME-PCI bridge that enables 2eSST data transfers at up to 180 MBps for VME board interconnection. Dual GigE interfaces and four asynchronous EIA-232/422/485 lines provide a range of high-speed networking and connection options. In addition, three differential 4x high-speed links are routed to the P0 backplane (as per PICMG 2.17), enabling the PowerNode3 CPU board to interconnect to fabric technologies based on the LVDS standard.

The PowerNode3 sets a new standard for low power consumption in a high-end node, with a typical draw of just 30W for dual CPU configuration, versus competitive boards that draw up to 60W (with 7455 1-GHz solutions). The new board is available in three convection-cooled versions (standard, extended temperature, and rugged) as well as a rugged conduction-cooled version for harsh environment applications.

FEATURES:

- First dual 1-GHz PPC CPU board at 30W
- Single/dual PowerPC G4 high-performance computing node
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EBX

PC/104

EPIC

STD 32

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Before Kristin Kuoni joined VersaLogic's sales support team, she guided tours at a natural history museum. She really knows how to keep products off the endangered species list.

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New SBC specification bridges to the future

By Rod Richmond, Octagon Systems Corporation

A new open standard for embedded computing was announced at the Embedded Systems Conference in March – a single-board computer standard that leverages current investment and simultaneously paves a smooth transition path to the future. Dubbed EPIC™ for Embedded Platform for Industrial Computing, the standard was cooperatively developed by Ampro Computing, Inc., Micro/Sys, Inc., Octagon Systems Corp., VersaLogic Corporation, and WinSystems, Inc., and it will soon be placed under the administrative umbrella of an independent technical standards body.

EPIC was developed to provide a missing link in the continuum of embedded system design today, as well as a bridge to future generations of systems. To date, developers of compact embedded systems have had a choice of two industry-standard form factors: the 13.5 square inches of PC/104 and PC/104-*Plus* with their 3.575" x 3.775" boards; and the 46" of EBX with its 5.75" x 8" form factor. The need for a form factor between these two has become evident, as numerous SBC companies have introduced products with mid-size form factors to suit their customers' requirements.

With the variations in sizes, connectors, and connector locations of these nonstandard mid-size boards, the benefits of open-architecture design have been lost to customers who can no longer rely on multiple sources for mechanically compatible SBCs to integrate into their system designs. EPIC provides a standardized alternative that eliminates the incompatibilities that have plagued this arena.

According to Eric Gulliksen, market analyst at Venture Development Corporation, "For years, the embedded single board computer market has suffered from the lack of a published mid-size motherboard standard. The publication of the EPIC form factor specification and the commitment by five market leaders brings relief to system manufacturers who need consistency and standardization in a mid-size SBC. EPIC could be the biggest development in the industry since the PC/104 Consortium was founded 12 years ago."

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EPIC nitty gritty

EPIC defines a 4.53" x 6.50" (115mm x 165mm) form factor, which has 29.4 square inches in total real estate and suits a broad range of applications for which EBX is too large a solution and PC/104-*Plus* would require multiple boards (refer to Figure 1). A multiple-board solution is, of course, always more expensive than a single-board design, and it also tends to reduce reliability, particularly in environments that are prone to extreme shock and vibration.

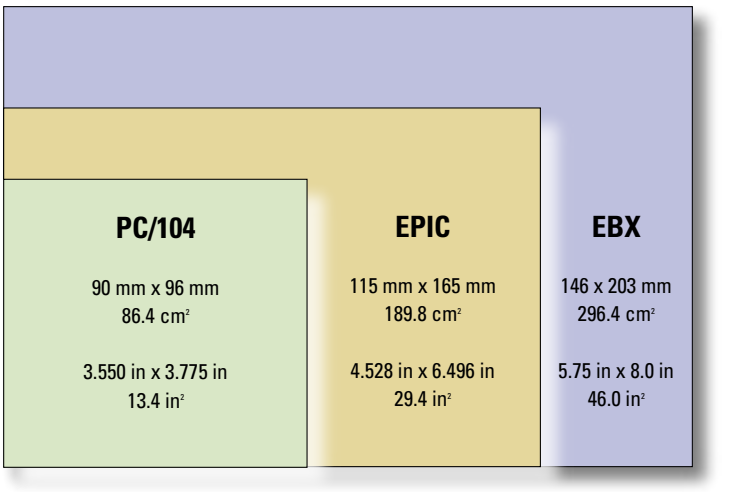

Figure 1

The new form factor is a little less than two-thirds the size of an EBX motherboard, enabling systems to be implemented with a significant savings in real estate. Additionally, at a little more than twice the size of a PC/104-*Plus* board, EPIC provides ample room for a leading-edge processor/memory subsystem, along with I/O expansion and appropriate connectors (see Figure 2). For I/O-intensive applications, connectors and cabling can become a major problem for small and mid-size SBCs. EPIC was developed with this in mind, solving potential difficulties by incorporating four separate I/O connector zones. According to John McKown, President of Octagon Systems Corp., "The EPIC design brings the CPU out from under the PC/104 stack allowing extended temperature operation beyond 1 GHz and enough room for legacy connectors, rather than the fragile sub-1.5mm connectors used on newer, high-density PC/104-*Plus* cards. Cables to these tiny connectors (made primarily for the consumer market) are difficult to terminate and rarely withstand the handling and vibration found in the industrial and transportation environments."

Leveraging investment into the future

Like EBX before it, the mezzanine bus standard adopted by EPIC is PC/104-*Plus*, enabling designers to tap into the many hundreds of PC/104 and PC/104-*Plus*

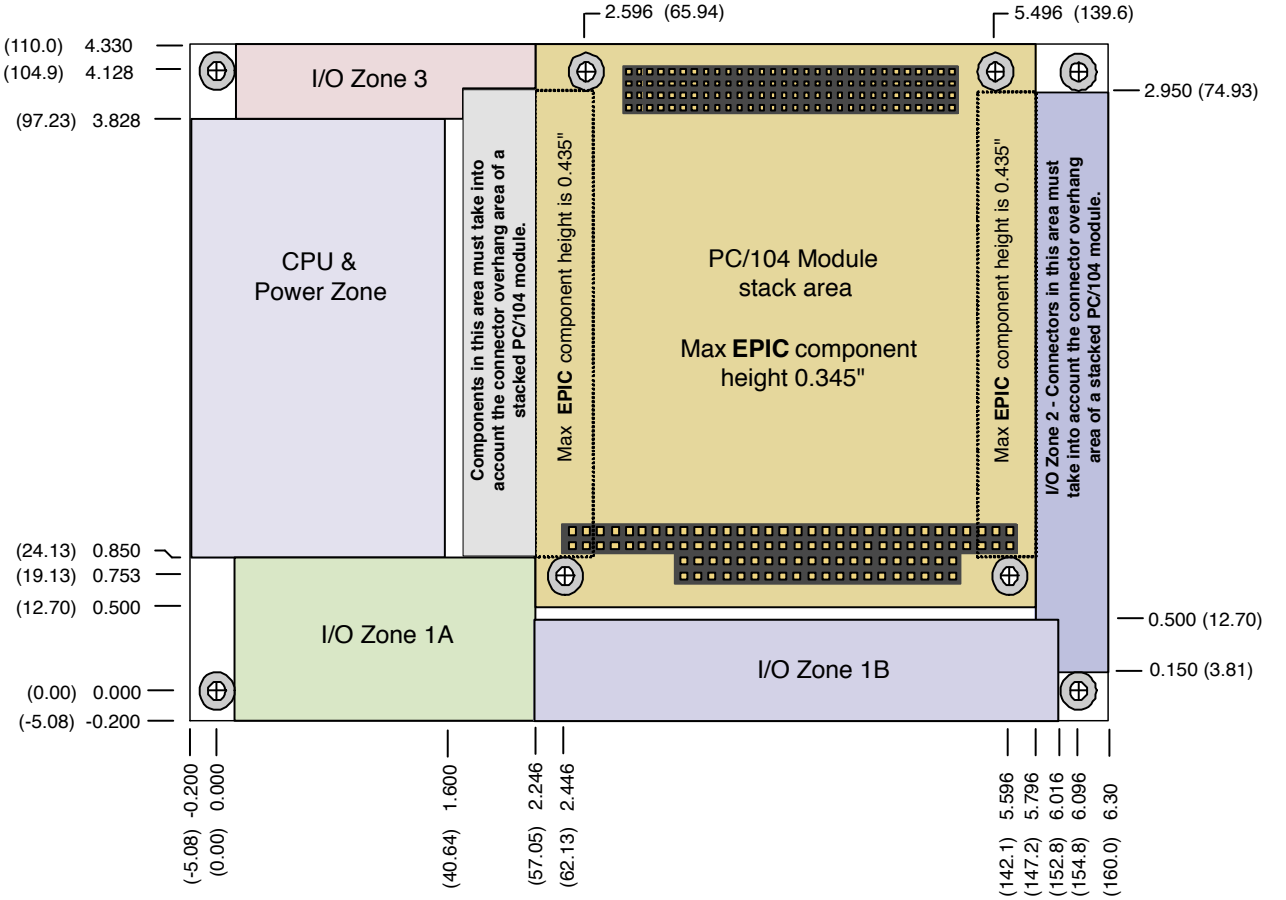

Figure 2

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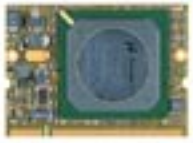

X-board (68 x 49mm)

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DIMM-PC (68 x 40mm)

- Extremely small, powerful X86 embedded computer module

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I/O modules available from scores of vendors worldwide. EPIC is, in fact, expected to add longevity to the PC/104 and PC/104-*Plus* buses, as well as expand their application range. The EPIC standard, however, also has the flexibility to accommodate the coming transition from buses to switched-fabric architectures based on high-speed serial interfaces – an inevitable transition for some applications.

It is yet unclear as to which of the alternative high-speed serial interfaces the embedded computing community will adopt, and there are a number of candidates: PCI Express, for example, ExpressCard, and RapidIO. With its uniquely flexible architecture, as the status quo clarifies, EPIC will evolve appropriately, and users will be able to smoothly migrate their legacy ISA, PCI, PC/104, and EBX bus-based designs. One of the first EPIC products, the XE-800, is based on a 300-MHz Pentium II processor, with six USB ports and a wealth of other legacy and industrial I/O (refer to Figure 3).

Figure 3

By bringing the benefits of both a standard mid-size form factor and advanced serial interconnects to the deeply embedded computing arena, EPIC will withstand the test of time, cutting across a broad range of applications, including automated test equipment, medical instrumentation, communications devices, transportation systems, semiconductor manufacturing gear, robotics, military systems, etc. EPIC cards are already on the market from three companies, with seven more committed to product introduction this year. The open specification is available at www.epic-sbc.org.

Rod Richmond *began in the telecommunications industry for Mountain Bell, developing business systems. He also spent 10 years with United Airlines developing testing methodologies for United's Apollo Reservations System. Rod is currently the engineering manager for Octagon Systems, developing new products with his talented team of design engineers.*

Octagon *has been making embedded computer products since 1981. The company's primary market consists of OEMs who embed computers in military and space applications, transportation, control, security and energy systems; and in medical instruments and data acquisition devices. Visit* www.octagonsystems.com *for more details.*

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BLADES

Flex21 cPCI Platform

FEATURES:

- 13U form factor, NEBS-compliant CompactPCI chassis for EIA 19" rack mounting
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BLADES

CP721

FEATURES:

- IBM PowerPC 440GX with processor speeds up to 600 MHz
- Single-slot solution that supports system or non-system controller slots
- PICMG 2.16-compliant with dual 10/100/1000Base-T ports routed to J3
- Up to 1 GB of DDR high-speed access memory and up to 1 GB of Flash memory
- Dual PMC slots designed for PCI 33-MHz/66-MHz bus speeds
- Operating system support for Linux and VxWorks

GE FANUC Embedded Systems

www.gefanuc.com/embedded

Designed around IBM's PowerPC 440GX, the CP721 is available with processor speeds from 466 MHz to 600 MHz and is fully hot swappable. The blade provides dual serial RS-232 as well as dual 10/100/1000Base-T ports routed to the J3 connector. The CP721 is PICMG 2.16-compliant and can be run as a system or non-system controller.

The CP721 provides up to 1 GB of DDR memory and a CompactFlash/Microdrive for up to 1 GB of additional storage capacity. The dual PMC sites provide additional I/O options and are routed to the CompactPCI backplane via the J3/J5 connectors.

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CHIPS

EX w/2 Ethernet

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- 256 KB on-chip SRAM, Flash, or Net boot
- 2x CAN, 4x serial, 1x USB, SPI, I2C channels
- 184-pin 12mm x 12mm BGA, 1.8V and 2.5V cores
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The EX is perfect for embedded applications that require two 10/100Base-T channels (one with built-in PHY) and other communication channels such as USB 1.1, 2x CAN, SPI, or 4x RS-232 or RS-422/485. With the on-chip, 256-KB RAM memory, users can load applications from SPI serial Flash or external Flash, or boot from the Ethernet network into the on-chip memory and execute with 0 wait-state performance and no external memory devices. Add external memory to support additional RAM or Flash for a total of up to 16 MB. The EX chip is a very small, 184-pin BGA and is 12mm x 12mm. Add a 25-MHz crystal, transceivers for communications ports, a connector or two, and you're done.

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Z8 Encore! XP® Flash Microcontrollers

FEATURES:

- Up to 4 KB Flash memory
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- Up to 128 bytes/Non-Volatile Data Storage (NVDS)
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- Direct LED drives

The Z8 Encore! XP™ family of Flash Microcontrollers provide the state-of-the-art MCUs in ZiLOG's microcontroller line-up offering Flash memory and a broad range of on-chip peripherals. The 4K Series (1K – 4K Flash) is the initial Z8 Encore! XP™ family member.

With up to 4 KB of Flash, up to 1 KB SRAM and up to 128 bytes/Non-Volatile Data Storage (NVDS), the Z8 Encore! XP provides enough memory so that programming can be changed, revised, and reprogrammed during development, in production, and updated in the field. Contributing to this highly integrated design is a 10-bit A/D converter (up to eight channels), an on-chip debugger, up to 18 interrupts, and up to 25 general-purpose I/O pins.

The Z8 Encore! XP™ family also features on-chip extended peripherals, including an internal precision oscillator with "fail-safe," temperature sensor, analog comparator (1x or 20x differential input gain), and a transimpedance (current sense) amplifier.

This flexible and easy-to-use MCU boasts superior noise susceptibility immunity making it ideal for appliance, fan and motor control, and general industrial applications. The temperature sensor and transimpedance amplifier offers designers of thermostats, smoke and carbon monoxide detectors, and security products further integration for their products.

Development could not be easier than with the Z8 Encore! XP™ 4K Series Development Kit. This tool is a complete solution providing all necessary hardware and software, including a free full-version ANSI C-Compiler, bringing your Z8 Encore! XP-based designs to market easier, faster, and more efficiently.

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XP-SB PCI Expansion Series

FEATURES:

- Adds two or three PCI expansion slots
- PCI 2.2-compliant
- Available in 1U rack-mount chassis
- Compatible with two-slot, 64-bit/66-MHz, and three-slot, 32-bit/33-MHz bus speeds
- Conforms to international emission and immunity standards
- Compatible with SPARC Solaris, Solaris x86, Windows 2000, Windows XP, and Linux
- Two 2.5-Gbps, full-duplex links that can be bundled to form a 5-Gbps, full-duplex link
- Compatible with CompactPCI, PCI, and VME host systems
- Consists of a PCI or optional PMC host card
- Chassis connects to the host via two shielded CAT5 cables with RJ-45 connectors
- XP-SB Series augments Aurora's existing lines of board and system expansion products

Aurora Technologies has developed its next generation of PCI expansion chassis utilizing StarGen's switch fabric PCI bridging technology. Designated the XP-SB Series, this innovative expansion system's PCI-to-StarFabric interface enables multiple chassis connection and is compatible with CompactPCI, PCI, and VME host systems. The XP-SB Series is ideal for users in industries that require maximum performance and continuous operation, such as telecommunications, military/defense, and industrial computing.

The XP-SB Series consists of a PCI or optional PMC host card and a 1U rack-mount chassis housing two (XP2-SB) or three (XP3-SB) PCI slots. A second chassis can be added for a total of four or six slots from a single host interface. The chassis connects to the host via two shielded CAT5 cables with RJ-45 connectors. The host and expansion unit can be placed up to five meters apart. Compliant with PCI 2.2 specifications, the XP2-SB supports 3.3V and universal voltage PCI cards, while the XP3-SB supports 5V and universal voltage PCI cards. The XP-SB Series is compatible with two-slot, 64-bit/66-MHz, and three-slot, 32-bit/33-MHz, bus speeds and supports SPARC Solaris, Solaris x86, Windows 2000, Windows XP, and Linux.

The XP-SB features two 2.5-Gbps, full-duplex links that can be bundled to form a 5-Gbps, full-duplex link to support demanding, real-time applications such as VoIP and edge routers. Reliability is enhanced by the use of four aggregate, 622-Mbps LVDS pairs to comprise each link. If a cable problem causes a pair to become inactive, operation continues at a reduced bandwidth.

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6861000-01 ATCA Development System

FEATURES:

- Available with six-slot dual star and full mesh backplanes
- Backplanes support PICMG 3.1, 3.2, 3.3, and 3.4 specifications
- Contains an ATCA-compliant Shelf Management System (ShMS™)
- Plugs directly into the Zone 1 connector of the backplane; manages the ATCA System Management Interface
- Provides the user with the necessary Shelf Management hardware
- Optional rear mounted AC power supply that provides –48VDCA&B
- Eliminates the need for an external –48VDC converter

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The 6861000-01 Model AdvancedTCA Development System comes with Shelf Management and optional AC input power, making it an ideal platform for the development of ATCA boards and platforms.

This new PICMG 3.0-compliant AdvancedTCA Development System from CG Mupac provides development engineers with a turnkey, compact bench-top chassis to test and debug their AdvancedTCA Fabric blades, switches, and other system components.

Designated Model #6861000-01, the unit contains the necessary power and cooling along with shelf management monitoring hardware. Model 6861000-01 is available with a six-slot, full mesh backplane that supports the AdvancedTCA PICMG 3.1, 3.2, and 3.3 specifications. The 6861000-01 features a removable fan tray that provides evacuation-style cooling to all the card slots. Also available is an optional rear-mounted AC power supply that provides –48VDCA&B, which eliminates the need for an external –48VDC converter. The 6861000-01 can be configured for 19" horizontal rack-mount, horizontal bench-top, and vertical tower applications.

Included in the development system is the SMM08, a board-mounted, AdvancedTCA-compliant Shelf Management System, which utilizes the Pigeon Point IPM Sentry™ Shelf Manager. The SMM08 plugs directly into the Zone 1 connector of the backplane and monitors the AdvancedTCA System Management Interface. Other optional features include front-panel kits and inserter/ejectors.

For more information, contact gavazzi@mupac.com.

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FABRICS & I/O

IB4X-PMC-2

FEATURES:

- VxWorks® drivers now available
- Sockets Direct Protocol (SDP) for TCP applications
- Internet Protocol over InfiniBand (IPoIB)
- SCSI Remote Protocol (SRP) initiator for SAN
- Message Passing Interface (MPI) for clustering
- Sophisticated Quality of Service (QoS) features

SBS Technologies

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The IB4X-PMC-2 is designed to provide the high throughput and low CPU utilization required for 10-Gbps embedded data transport applications and high-performance computing clustering (HPCC). The HCA is configured with 128 MB of DDR memory. The InfiniBand™ architecture defines and supports many applications, most with Remote Direct Memory Access (RDMA) capabilities. RDMA combined with the inherent characteristics of InfiniBand offers a high level of dexterity and enables high-performance data mover, clustering, communication, and storage traffic to run over an InfiniBand fabric. The IB4X-PMC-2 is based on Mellanox's InfiniHost™ silicon. The core fully supports RDMA transfers.

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FABRICS & I/O

PMC-ISCSI-ST

FEATURES:

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- Single front panel, 1000Base-T interface
- Supports full duplex mode
- Transmit and receive FIFOs
- ISCSI drivers for VxWorks® and Linux are available
- Standard Ethernet drivers for VxWorks® and Linux are available

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A single-wide, 32/64-bit, 33/66-MHz PCI, 66/133-MHz PCI-X PCI Mezzanine Card (PMC) providing the dual functionality of an iSCSI host controller and either TCP/IP offloaded or standard Ethernet controller with a single 1000Base-T front-panel interface. Using Ethernet, this PMC moves data at 1 Gbps speed with minimal CPU utilization and low latency. PMC-ISCSI-ST uses a QLogic ISP4010 iSCSI controller that includes both the PCI/PCI-X host bus interface and the 1000Base-T interface. Drivers can interface with the controller at various protocol levels: SCSI, TCP, IP, and Ethernet. The chip has two embedded 32-bit RISC processors for protocol stack processing support.

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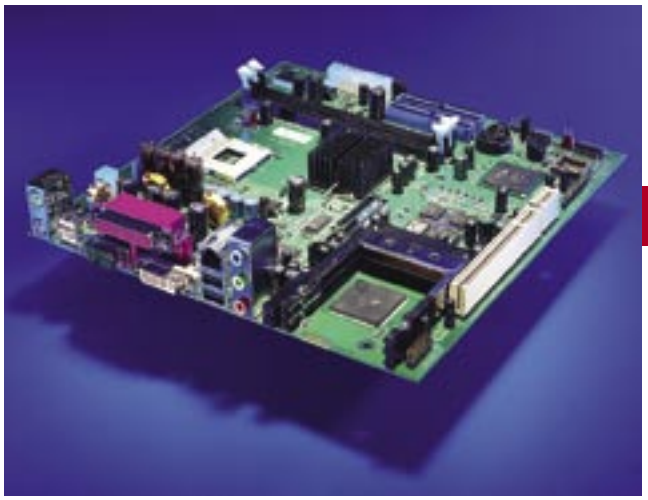

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- Intel® Pentium® 4 processor
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- Wireless- or cellular-capable via dual slot CardBus or CompactFlash
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For more than 25 years, Micro Industries Corporation of Westerville, Ohio, has provided electronic engineering and manufacturing services to OEMs, helping them translate their concepts into cost-effective embedded and integrated computer systems for a variety of markets. Micro Industries manufactures Touch&Go™ computer systems and motherboards in two facilities in the Columbus, Ohio area, with a management system registered to ISO 9001:2000 and ISO 14000:1996. Micro Industries is an Affiliate Member of the Intel Communications Alliance.

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High Performance Intelligent PMC Carriers

FEATURES:

- VP31x/02x: Dual PMC, rear I/O; Pentium M @ 1.1/1.6/1.8 GHz; 1-GB, 266-MHz ECC; 2xGigE, VITA31.1; GUI; EIDE
- VP30x/01x: PMC, rear I/O; Pentium M @ 1.1/1.6/1.8 GHz; 1.5-GB, 200-MHz ECC; 2xGigE, VITA31.1; GUI; EIDE; AppFlash; FDC
- VP110/01x: Dual PMC, rear I/O; Pentium III @ 800/933 MHz; 1-GB, 133-MHz ECC; 2xFastE; EIDE; AppFlash; NVRAM; FDC
- VP101/01x: PMC, rear I/O; Pentium III @ 800/933 MHz; 1.5-GB, 133-MHz ECC; 2xFastE; GUI and DFP; EIDE; UW-SCSI; FDC
- VP742/20x: PMC, rear I/O; MPC7455 @ 800 MHz/1 GHz; 1.25-GB, 266-MHz ECC; 2xGigE; GUI; U160-SCSI, NVRAM
- VP742/10x: Dual PMC, rear I/O; MPC7455 @ 800 MHz/1 GHz; 1-GB, 100-MHz ECC; 1xFastE; NVRAM
- VP741/10x: Dual PMC, rear I/O; MPC7410 @ 500 MHz; 1-GB, 100-MHz ECC; 1xFastE; NVRAM
- PP31x/01x: Dual PMC; PentiumM @ 1.1/1.6/1.8 GHz; 2-GB, 200-MHz ECC; 2xGigE, PICMG 2.16; GUI; EIDE/U160-SCSI, FDC
- PP220/01x: PMC; Dual Xeon @ 2.0 GHz; 4-GB, 200-MHz ECC; 2xGigE, PICMG 2.16; GUI; EIDE, AppFlash; NVRAM; FDC
- PP200/01x: PMC; Pentium 4-M @ 1.7/2.2 GHz; 2-GB, 200-MHz ECC; 3xGigE, PICMG 2.16; GUI; EIDE/U160-SCSI, AppFlash; FDC
- PPCP2/P3x: PMC; Pentium III @ 850 MHz/1 GHz; 512 MB, 100 MHz; 2xFastE, PICMG 2.16; GUI; EIDE, AppFlash; FDC
- Optional operating temperatures: –40°C to +85°C (with humidity seal) and/or –25°C to +70°C (optional humidity seal)

Concurrent Technologies

3840 Packard Road
Ann Arbor, MI 48108
Tel: 734-971-6309 • Fax: 734-971-6350

CONCURRENT TECHNOLOGIES

www.gocct.com

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For more information, contact info@gocct.com. **RSC #36 @ www.embedded-computing.com/catalogrsc**

PMCs/CARRIERS

453X PMC/PTMC

FEATURES:

- 300-MHz MPC8264 (PowerQUICC II) processor
- Passive and intelligent carrier boards also available in CompactPCI, CPSB, and AdvancedTCA form factors
- One Fast Ethernet interface for remote management or interworking
- Integrated CSU on T1 lines (eliminating the need for additional line termination equipment) with support for facility data link
- Support for ATM AAL0, AAL2, and AAL5 adaptation layers
- Multi-protocol capable to support SS7, ATM, frame relay, X.25, Q.SAAL, HDLC, and PPP, plus interworking of multiple protocols

INTERPHASE
Designed To Perform. Designed To Last.™

www.interphase.com

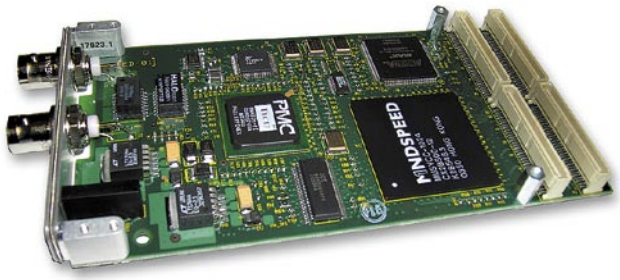
Gateway-on-a-card, voice, data, ATM, frame relay, and signaling traffic can be intermixed to migrate to advanced networks without the replacement of legacy equipment. 453X cards can simultaneously support the following: ATM, SS7, PPP, HDLC, Ethernet, frame relay, X.25, Q.SAAL, ATM to IP interworking, frame relay and voice traffic over TDM, frame relay conversion to IP over Ethernet, signaling and IP over Ethernet, frame relay conversion to ATM, signaling termination of narrow-band to broadband SS7 interworking, ATM to TDM interworking, and voice pass-through to DSPs.

Interphase Corporation
2901 N. Dallas Parkway, Suite 200
Plano, TX 75093
Tel: 214-654-5000 • Fax: 214-654-5500

For more information, contact pduffy@iphase.com.

RSC #**3701** @ www.embedded-computing.com/catalogrsc

PMCs/CARRIERS



wanPMC-C1T3

FEATURES:

- Fully channelized T3 interface on a single PMC slot
- Capable of terminating 672 HDLC channels; HDLC and transparent modes supported
- PCI 2.1 33/66-MHz and 32/64-bit bus interface
- Line interface unit provides signal conditioning; B3ZS coding, and loopback capability
- DS3-to-TDM framing and multiplexing
- Software selectable loop or line timing mode

SBE®

www.sbei.com

SBE's wanPMC-C1T3 is a fully channelized T3 Wide Area Networking (WAN) PMC adapter capable of terminating 672 HDLC channels. Designed to enable advanced voice and data applications such as VoIP, video-on-demand, voice conferencing, Internet routing, and SAN pipes, the wanPMC-C1T3 integrates a fully channelized, single-port T3 interface with an HDLC/transparent controller on a PMC slot. The wanPMC-C1T3 includes an M13 multiplexer, 28 T1/E1 framers, signal conditioning, B3ZS coding, loopback capability, and a 32/64-bit, 33/66-MHz PCI interface.

Both Red Hat and TimeSys embedded Linux drivers are provided with the wanPMC-C1T3.

SBE, Inc.
2305 Camino Ramon, Suite 200
San Ramon, CA 94583
Tel: 925-355-2000 • Fax: 925-355-2022

For more information, contact info@sbei.com.

RSC #**3702** @ www.embedded-computing.com/catalogrsc

PMCs/CARRIERS

3954

FEATURES:

- Extend PMC or PrPMC for test access
- 32-bit/33-MHz and 64-bit/66-MHz (3.3V or 5V)
- Metering functions show current, voltage, and BW use
- LEDs provide power and bus activity
- Test header for attaching logic analyzer (16 channels)

Technobox, inc.™

www.technobox.com

The 3954 allows extension of a PMC or PrPMC to facilitate test access. With support for 32-bit/33-MHz and 64-bit/66-MHz (3.3V or 5V), the extender features metering capabilities for measuring and displaying current and voltage levels as well as bus bandwidth utilization/consumption. An operator can rotate through metering functions and sampling intervals using onboard switches. Meter design provides on-the-fly zeroing and calibration based on EEPROM resident parameters. LEDs show power and bus activity status. A 20-pin test header (compatible with HP termination adapters) allows connection of a logic analyzer (up to 16 channels).

Technobox, Inc.
PMB 300, 4201 Church Road
Mount Laurel, NJ 08054
Tel: 609-267-8988 • Fax: 609-261-1011

For more information, contact info@technobox.com.

RSC #**3801** @ www.embedded-computing.com/catalogrsc

PMCs/CARRIERS

4170

FEATURES:

- Silicon Image 680 controller
- Accepts 2.5-inch ATA/IDE HD or solid-state disk
- Standard mounting
- Link activity LED
- Media optional

Technobox, inc.™

www.technobox.com

This PMC board, which is built around the Silicon Image 680, is designed to accept 2.5-inch ATA/IDE mass storage media, either rotating hard disk drive or a solid state Flash disk, using industry standard mounting. Media is normally installed by the end user.

Technobox, Inc.
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Mount Laurel, NJ 08054
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For more information, contact info@technobox.com.

RSC #**3802** @ www.embedded-computing.com/catalogrsc

4289

FEATURES:

- 32 channels of general-purpose RS-422/485 digital I/O
- Enhanced second-generation, FPGA design
- Supports 64-bit/66-MHz PCI bus
- Reprogrammable by host or onboard Flash
- Variable SRAM architectures acceptable

Technobox, inc.™

www.technobox.com

The enhanced 32-channel, reconfigurable RS-422/485 digital I/O PMC provides a vehicle for implementing complex digital designs requiring a differential interface. A second-generation FPGA-based design, the 4289 improves on its predecessors with additional features, including 64-bit/66-MHz PCI bus support, 66-MHz local bus clock, and up to 20K LEs. All 32 general-purpose RS-422/485 digital I/Os are wired to both the front panel and rear PN4 connector. The 32-bit data bus is shared between the FPGA and PCI interface devices. SRAM is driven by FPGA outputs, allowing a variety of memory architectures, e.g., single-port SRAM; dual-port SRAM, and one or more FIFOs.

Technobox, Inc.
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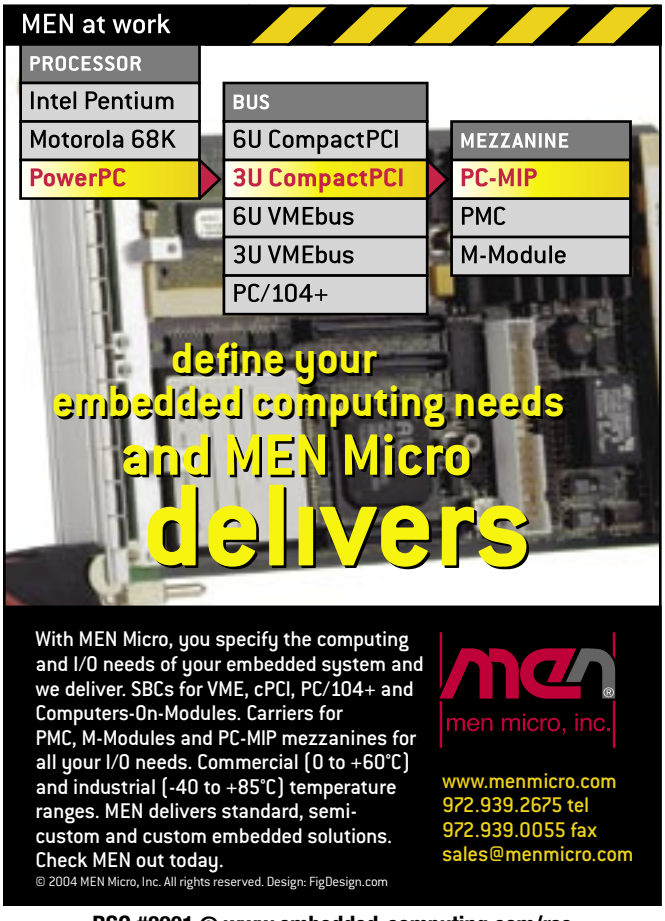
For more information, contact info@technobox.com.

RSC #3903 @ www.embedded-computing.com/catalogrsc



RSC #3901 @ www.embedded-computing.com/rsc

RSC #3902 @ www.embedded-computing.com/rsc

PMCs/CARRIERS

4311

FEATURES:

- PMC-X to PCI-X adapter with bus metering functions
- Supports PCI (33/66 MHz) and PCI-X (66/100/133 MHz)
- Accommodates both PMCs and PIMs
- Multiple metering functions with LED readout
- Optimized design to preserve signal quality
- XCAP and M66EN signal support

Technobox, inc.™

www.technobox.com

The metering PMC-X to PCI-X adapter is a development tool for debugging and/or demonstrating a PMC-based solution in a PCI slot. Both PCI signaling (32/64 bit, 33/66 MHz) and PCI-X signaling (32/64 bit, 66/100/133 MHz) are supported. A PMC I/O card (PIM) can also be attached to the adapter. When mounted, the PMC or PIM under test is oriented vertically, exposing the bulk of the component areas for probing. A unique feature of the extender is its metering function used to measure power voltages and current. A built-in frequency counter measures PCI bus clock frequency. Modes include real-time, minimum and maximum value capture, range display, and averaging. XCAP and M66EN signals are supported.

Technobox, Inc.
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For more information, contact info@technobox.com.

RSC #**4001** @ www.embedded-computing.com/catalogrsc

PMCs/CARRIERS

4352

FEATURES:

- Adapts PMC or PMC-X modules to PCI or PCI-X
- Employs Intel 31154 bridge
- Supports PCI (33/66) and PCI-X (66/100/133)
- Rear I/O support
- LEDs show status of key PCI bus signals and power
- Accommodates external power

Technobox, inc.™

www.technobox.com

The 4352 is a PMC-X to PCI-X adapter that allows delivery of PMC-derived applications in a standard PCI or PCI-X environment. An Intel 31154 bridge supports PCI (33 or 66 MHz) and PCI-X (66/100/133 MHz) on both the primary and secondary buses. 32-bit and 64-bit transactions are supported. Furthermore, the bridge will translate transfer width, clock frequency, and protocol differences. LEDs provide status of power and key bus signals. To assure solid connection with the PMC bezel, the adapter features a machined aluminum panel. Rear I/O signals are directed to a 96-pin DIN connector situated on the rear of the adapter. External power can be applied. An optional cooling fan is available.

Technobox, Inc.
PMB 300, 4201 Church Road
Mount Laurel, NJ 08054
Tel: 609-267-8988 • Fax: 609-261-1011

For more information, contact info@technobox.com.

RSC #**4002** @ www.embedded-computing.com/catalogrsc

4366

FEATURES:

- Adapts 32 or 64-bit PMC (33 MHz) to PCI slot
- Designed for optimal signal quality
- Support for rear I/O
- LEDs show status of key PCI bus signals and power
- Accommodates external power
- Optional fan assembly for additional cooling

Technobox, inc.™

www.technobox.com

The 4366 is a passive PMC-to-PCI adapter that allows use of a 32 or 64-bit/33-MHz PMC in a PCI slot. Diagonal routing, impedance controlled signal layers, and four power planes optimize signal quality. To assure a solid mechanical connection for the PMC bezel, the adapter features a machined aluminum front panel. The 64 rear I/O signals from the PMC are directed to a 96-pin DIN connector situated on the rear of the adapter. Several LEDs show the status of power and key PCI bus signals. External power can be supplied to the adapter. An optional fan assembly (P/N 3675) can be installed to augment cooling.

Technobox, Inc.
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Mount Laurel, NJ 08054
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For more information, contact info@technobox.com.

RSC #4103 @ www.embedded-computing.com/catalogrsc

RSC #4101 @ www.embedded-computing.com/rsc

RSC #4102 @ www.embedded-computing.com/rsc

PMCs/CARRIERS

4382

FEATURES:

- Supports four SATA devices (1.5 Gbps per link)
- Intel 31244 controller
- PCI-X capable
- Status LEDs show link activity
- Onboard BIOS
- PLD provides: I2C controller, level translators, four RS-232 UARTS, system monitors, and two analog inputs

Technobox, inc.™

www.technobox.com

This PCI-X capable board provides four 1.5-Gbps links to support as many as four cable-attached SATA devices. Although designed for PCI-X, the 4382 also will function with lower speed 33/66-MHz buses and in 32/64-bit modes. It supports 3.3V and 5V bus signaling. Four SATA ports are front-panel accessible. Status LEDs show link activity. BIOS is stored in EEPROM, accessible via a Serial Peripheral Interface (SPI) bus. Attached to the SPI bus is an Altera PLD with a system monitor that can sense and report power levels. Additionally, the monitor can determine local temperature from a user-supplied 2N3904 junction diode and can read two analog inputs on the PN4 connector.

Technobox, Inc.
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For more information, contact info@technobox.com.

RSC #**4201** @ www.embedded-computing.com/catalogrsc

SBCs

FX5500 Compact System

FEATURES:

- Compact, all-in-one design with power adapter ready
- VGA, dual Ethernet, and Video (NTSC/PAL) outputs
- DiskOnModule and built-in CompactFlash adapter
- PCMCIA interface with 2S1P and USB
- Low power units
- User-defined LED indicators

ABIA

www.abiatech.com

FX5500 is a feature-rich compact unit with a PCMCIA interface, USB, 2S1P, dual Ethernet, and multimedia capability (NTSC/PAL included). FX5500 can play an important role in networking, POS, and industrial control fields with the ease to expand and interface. FX5500 offers space for a 2.5" hard drive and a DiskOnModule with a built-in CompactFlash adapter. It can easily run OSs like CE .NET and embedded Linux from a Flash device to ensure operation reliability. FX5500 offers LED indicators for power, HDD/CF, and Ethernet, plus a user-programmable LED. It also comes with an external power adapter, so users can simply plug and play. For other features or similar products, contact Abia Tech directly.

ABIA Technology
4835 Linaro
Cypress, CA 90630
Tel: 714-821-8762 • Fax: 714-952-3306

For more information, contact info@abiatech.com.

RSC #**4202** @ www.embedded-computing.com/catalogrsc

Embedded board

FEATURES:

- 5.25" compact size
- Intel® 852GME chipset
- Dual independent display
- Support Pentium® 4 Prescott processor up to 3.06 GHz
- Four USB 2.0 ports, gigabit Ethernet (optional), audio, CompactFlash, and more

American Portwell Technology

www.portwell.com

The features on the PEB-3715VLA embedded system board utilize Intel's platform architecture to deliver the highest performance required for cutting-edge applications. Designed in a compact 5.25" form factor, it supports dual independent display feeds to allow different images to be viewed on different displays concurrently. PEB-3715VLA is the perfect fit for interactive client applications such as POS/POI/Kiosk/ATM/Gaming, and more. At American Portwell, we provide solutions for the deployment of interactive client platforms by minimizing development risks, and provide full technical support throughout the product life cycle.

American Portwell Technology
6851 Mowry Avenue
Newark, CA 94560
Tel: 510-585-4126 • Fax: 510-790-9191

For more information, contact marketing@mail.portwell.com. RSC #4303 @ www.embedded-computing.com/catalogrsc

RSC #4301 @ www.embedded-computing.com/rsc

RSC #4302 @ www.embedded-computing.com/rsc

SBCs

EMB-863

FEATURES:

- Intel Pentium 4m, low-power mobile CPU with available "fan-less" operation
- AGP 8x video controller with LCD support
- Quad RS-232 and USB 2.0 ports
- Four-channel digital IO ports
- Supports both AT and ATX power supplies
- Onboard 3M (Dynapro) touch-screen controller

ATIOSYS™ APPLIED TECHNOLOGY in INDUSTRIAL OPERATIONS

www.atiosys.com

ATIO System has introduced a compact SBC with Pentium 4-level performance for the embedded application. ATIO System's EMB-863 utilizes the most powerful low-power mobile processor available – the Intel Pentium 4m. This processor enables the EMB-863 the potential of running at 2.0+ GHz, completely "fan-less." The EMB-863 is fully loaded with features such as an AGP 8x video controller with LCD support, multichannnel audio, a CompactFlash drive, Serial ATA, quad RS-232 serial ports, Ethernet LAN, DIO, and more. One feature incorporates an onboard, touch-screen controller, which allows easy integration into a flat-panel computer. ATIO System also provides complete OEM system design and manufacturing services.

ATIO System Inc.
9576 Topanga Canyon Blvd.
Chatsworth, CA 91311
Tel: 818-717-5135 • Fax: 818-717-8075

For more information, contact sales@atiosys-usa.com.

RSC #**4401** @ www.embedded-computing.com/catalogrsc

SBCs

MBM-868CN

FEATURES:

- Compact Socket 370 SBC, Intel Pentium III, Celeron, and VIA C3 CPU
- Dual gigabit 10/100/1000Base-T controllers
- Flexible data storage through SATA, IDE, and CompactFlash
- External device connections through USB 2.0, serial, and parallel ports
- AGP-8x video and multichannel audio
- DDR SDRAM memory up to 1 GB

ATIOSYS™ APPLIED TECHNOLOGY in INDUSTRIAL OPERATIONS

www.atiosys.com

ATIO System offers one of the most powerful Socket 370 SBCs for the embedded market – the MBM-868CN. Starting with the processors, the MBM-868CN supports: Intel Pentium III, up to 1.4 GHz, for performance-oriented applications; Intel Celeron, up to 1.4 GHz, for budget-minded applications; and VIA C3, up to 1.2 GHz, for low-power or "fan-less" applications. The MBM-868CN supports DDR memory up to 1 GB, meeting most application requirements. Other unique features include dual gigabit LAN, AGP-8x video, USB 2.0, Serial-ATA, CompactFlash, and much, much more! All of these features are packaged into a competitively priced compact SBC. ATIO System offers complete system design and manufacturing services.

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RSC #**4402** @ www.embedded-computing.com/catalogrsc

High Performance Single Board Computers

FEATURES:

- VP31x/02x: Dual PMC, rear I/O; Pentium M @ 1.1/1.6/1.8 GHz; 1-GB, 266-MHz ECC; 2xGigE, VITA31.1; GUI; EIDE
- VP30x/01x: PMC, rear I/O; Pentium M @ 1.1/1.6/1.8 GHz; 1.5-GB, 200-MHz ECC; 2xGigE, VITA31.1; GUI; EIDE; AppFlash; FDC
- VP110/01x: Dual PMC, rear I/O; Pentium III @ 800/933 MHz; 1-GB, 133-MHz ECC; 2xFastE; EIDE; AppFlash; NVRAM; FDC
- VP101/01x: PMC, rear I/O; Pentium III @ 800/933 MHz; 1.5-GB, 133-MHz ECC; 2xFastE; GUI & DFP; EIDE; UW-SCSI; FDC
- VP742/20x: PMC, rear I/O; MPC7455 @ 800 MHz/1 GHz; 1.25-GB, 266-MHz ECC; 2xGigE; GUI; U160-SCSI, NVRAM
- VP742/10x: Dual PMC, rear I/O; MPC7455 @ 800 MHz/1 GHz; 1-GB, 100-MHz ECC; 1xFastE; NVRAM
- VP741/10x: Dual PMC, rear I/O; MPC7410 @ 500 MHz; 1-GB, 100-MHz ECC; 1xFastE; NVRAM
- PP31x/01x: Dual PMC; PentiumM @ 1.1/1.6/1.8 GHz; 2-GB, 200-MHz ECC; 2xGigE, PICMG 2.16; GUI; EIDE/ U160-SCSI, FDC
- PP220/01x: PMC; Dual Xeon @ 2.0 GHz; 4-GB, 200-MHz ECC; 2xGigE, PICMG 2.16; GUI; EIDE, AppFlash; NVRAM; FDC
- PP200/01x: PMC; Pentium 4-M @ 1.7/2.2 GHz; 2-GB, 200-MHz ECC; 3xGigE, PICMG 2.16; GUI; EIDE/U160-SCSI, AppFlash; FDC
- PPCP2/P3x: PMC; Pentium III @ 850 MHz/1 GHz; 512-MB, 100-MHz ECC; 2xFastE, PICMG 2.16; GUI; EIDE, AppFlash; FDC
- Optional operating temperatures: –40°C to +85°C (with humidity seal) and/or –25°C to +70°C (optional humidity seal)

Concurrent Technologies

3840 Packard Road
Ann Arbor, MI 48108
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CONCURRENT TECHNOLOGIES

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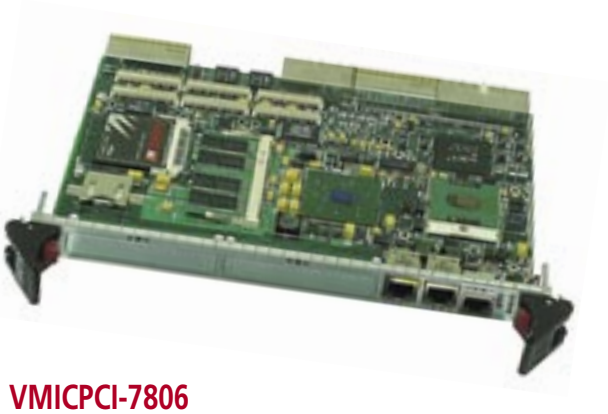
Concurrent Technologies has offices in the United Kingdom and North America, which are represented worldwide through local distribution channels.

For more information, contact info@gocct.com.

RSC #45 @ www.embedded-computing.com/catalogrsc

SBCs



VMICPCI-7806

FEATURES:

- Intel's Pentium M processor up to 1.8 GHz or Intel's Celeron M processor up to 1.3 GHz
- 6U single-slot universal controller with up to 1 GB of DDR SDRAM
- Dual 3.3V PMC sites (one for 64-bit/66-MHz PCI, and one for 32-bit/33-MHz PCI)
- Two GigE ports, two serial ports, two USB 2.0 ports, parallel and serial ATA, up to 1 GB of CompactFlash
- Meets PICMG 2.16 (CompactPCI Packet Switching Backplane) and PICMG 2.9 (IPMI) compliance
- Supports Windows 2000, Windows XP, QNX, Linux, and VxWorks operating systems

GE FANUC Embedded Systems

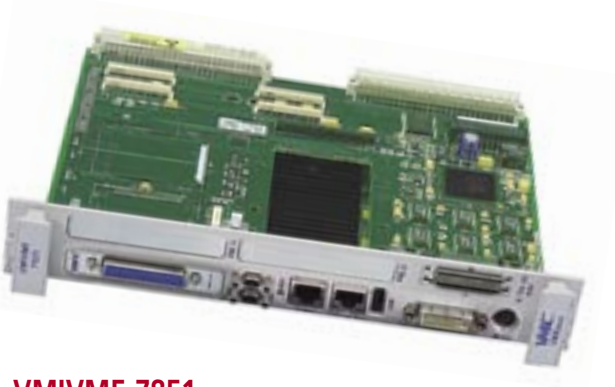
www.gefanuc.com/embedded

The VMICPCI-7806 is a low-power SBC for robust, reliable, high-performance applications. Available with either Intel's Pentium M or Celeron M processor technology, the SBC features a 400-MHz system bus and incorporates Intel's 855GME graphics memory controller. The dual GigE port is user configurable for support via the front panel (RJ-45) or the backplane (J3) to comply with PICMG 2.16. Utilizing Intel's new highly integrated 6300ESB I/O controller hub, the VMICPCI-7806 offers two PMC sites, two serial ports, two USB 2.0 ports, parallel and serial ATA, and a CompactFlash option.

GE Fanuc – Embedded Systems
12090 South Memorial Parkway
Huntsville, AL 35803-3308
Tel: 256-880-0444 • Fax: 256-882-0859

For more information, contact info.embeddedsystems@gefanuc.com. RSC #**4601** @ www.embedded-computing.com/catalogrsc

SBCs



VMIVME-7851

FEATURES:

- Intel Pentium 4 Processor-M offering speeds up to 2.2 GHz; 1.1 GHz extended temperature option
- Up to 1 GB SDRAM and up to 1 GB CompactFlash memory
- Up to three 5V PMC sites supporting 32-bit/33-MHz PCI bus speeds
- One 10/100/1000Base-T port, one 10/100Base-T port, two serial ports, and one USB 2.0 port
- SGVA/DVI-I, enhanced parallel port, and optional dual-channel Ultra160 SCSI and IDE hard drive
- Operating system support for Windows 2000, Windows XP, QNX, Linux, and VxWorks

GE FANUC Embedded Systems

www.gefanuc.com/embedded

The VMIVME-7851 is a dual-slot VME SBC ideal for bandwidth intensive applications requiring multiple I/O interfaces. Operating at up to 2.2 GHz, the SBC integrates Intel's Pentium 4 Processor-M with up to three PMC expansion sites, an enhanced parallel port, and optional dual-channel Ultra160 SCSI and IDE hard drive capabilities.

The VMIVME-7851 provides a 400-MHz system bus, up to 1 GB of 200-MHz DDR SDRAM, as well as a front-panel video interface (DVI-I) for both digital and analog display support. An extended operating temperature option is available for those running temperature sensitive applications.

GE Fanuc – Embedded Systems
12090 South Memorial Parkway
Huntsville, AL 35803-3308
Tel: 256-880-0444 • Fax: 256-882-0859

For more information, contact info.embeddedsystems@gefanuc.com. RSC #**4602** @ www.embedded-computing.com/catalogrsc

SBCs

VMIVME-7807

FEATURES:

- Intel Pentium M offering speeds up to 1.8 GHz and 1.5 GB DDR SDRAM
- One 3.3V PMC expansion site supports PCI-X at 66-MHz bus speed
- Dual GigE with optional VITA 31.1 support via P0
- One 10/100Base-T port, four serial ports, and four USB 2.0 ports
- SVGA/DVI, serial ATA, IDE, and up to 1 GB CompactFlash
- Operating system support for Windows 2000, Windows XP, QNX, Linux, and VxWorks

FANUC Embedded Systems

www.gefanuc.com/embedded

The VMIVME-7807 is a highly flexible, high-performance SBC that integrates Intel's Pentium M processor with up to 1.5 GB DDR SDRAM, dual GigE (VITA 31.1 option) interfaces, and a PCI-X, 66-MHz PMC expansion slot for additional I/O options. Operating at up to 1.8 GHz, the SBC provides high bandwidth and processing power and is ideal for I/O intensive applications.

Utilizing Intel's highly integrated 6300ESB I/O controller hub, the VMIVME-7807 offers four serial ports, four USB 2.0 ports, serial ATA, IDE, and up to 1 GB of optional CompactFlash. SVGA and DVI support is also provided.

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SBCs

Vortex86 CE 5.0 SDK

FEATURES:

- Complete turnkey system works right out of the box
- Pre-configured Windows CE OS image, SDK and support files
- Hands-on lab style, step-by-step guide shows all required steps to generate Windows CE image using Platform Builder
- Develop application in familiar Windows environment using Embedded Visual C++, Visual C .NET, or Visual Basic .NET 2003
- Perform pre-development proof-of-concept quickly to reduce development costs and risk

ICOP intelligent control on processor

www.icoptech.com

Vortex86 Windows CE 5.0 SDK is a CE development kit for x86 developers for the Vortex86 platform. Vortex86 is a System-on-Chip 486/166MMX equivalent processor that builds in video and audio in a single chip. Its hardware platform is an option in CE 5.0 platform builder. This kit can help developers evaluate and develop CE within the shortest time and for the lowest costs. For users who need TFT LCD solutions, VOX-AU084 SDK Open Frame Panel PC provides an LCD, touch screen, and fully functional 3.5" SBC. Vortex86-6047 can be easily packaged into the final products. Thin client developers can try eBox-II Learning Kit, which is equipped with VGA, LAN, audio, and I/O interfaces, and all drivers are ready.

ICOP Technology Inc.
12328 E. Valley Blvd., Suite B
El Monte, CA 91732
Tel: 626-444-6666 • Fax: 626-444-9966

For more information, contact info@icoptech.com. RSC #4702 @ www.embedded-computing.com/catalogrsc

Removable BGA Heatsinks: EZ Snap™ Series

FEATURES:

- Offered in round pin, plate fin, elliptical fin, and square pin designs
- Standard BGA heatsinks range from 21mm to 45mm footprints
- Overall heights available from 0.28" to over 1.28" for low-, standard- and high-profile applications
- Compatible with various chip heights and package types, including plastic, ceramic, and metal
- Black anodized plating delivers enhanced protection in harsh environments and better performance in natural convection
- All products are provided pre-assembled, with lightweight aluminum heatsink, selected clip size, and thermal pad options
- Small quantities are available for testing through www.radianstore.com
- Contact Radian for complimentary CFD anlalysis, engineering assistance, volume pricing, and custom cooling solutions

The Revolutionary EZ Snap™ Clip:

- Easily installed, with no special board modifications or additional mounting accessories needed
- Tension-mounted to snap on; self-aligns over micro-processor and maintains constant pressure on chip
- Secure attachment withstands excessive shock and vibration, in accordance with JEDEC 22-A101-A, condition C

Radian Heatsinks,
a division of Intricast Company, Inc.

2160 Walsh Avenue
Santa Clara, CA 95050-2512
Tel: 800-689-2802 • Fax: 408-988-0683

radian

www.radianheatsinks.com

Radian's EZ Snap™ Heatsinks provide optimum cooling for various BGA chips and packages. Available in many size, height, and pin shape combinations, these off-the-shelf assemblies are high-efficiency, cost-effective solutions that require no special board modifications or complex assemblies.

Versatile package types

Radian's BGA Heatsinks are conveniently sized to fit BGA packages from 21mm to 45mm and a variety of chip heights. Standard overall heights range from 0.28" to over 1.28" high. Each lightweight assembly includes a black anodized aluminum heatsink, with selected clip and thermal pad options. Thermally conductive, double-sided adhesive pads are available for plastic, ceramic, and metal packages when clips are not required.

High efficiency solutions

Offered in various pin configurations, Radian's BGA Heatsinks are designed for optimum performance under diverse temperature and airflow environment demands. The low-profile round and square pin designs are ideal for maintaining unconstrained microprocessor performance when available space and/or weight are limited.

Tailored design and engineering support

Radian offers complimentary CFD analysis and tailored design/mechanical engineering assistance to ensure all cost and performance requirements are met, if not exceeded. For custom designs, Radian uses Rapid Prototyping technologies to deliver metal prototypes in one to three weeks. To provide maximum design flexibility and cost-effective production, Radian is equipped with a comprehensive range of manufacturing capabilities, including thin fin extrusion, precision forging, castings, skived fin, stamped fin, and machining.

For more information, contact radiansales@radianheatsinks.com.

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Efficient and innovative embedded solutions are critical, so is an efficient distributor. As the catalog distributor focused on the needs of engineers, Mouser is an all-in-one package. We not only deliver the latest technologies, but the great service and support you need.

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AVC-cPCI 3000

FEATURES:

- RL4 single board computer
- 750/755 400-500 MHz
- 1 MB L2 Cache, 1.6 GBps
- CHRP architecture
- VxWorks® and LynxOS® support
- Up to 128 MB, 100 MHz SDRAM with ECC
- Up to 64 MB Flash, 64-bit
- 8 MB boot Flash
- 32 kB AutoStore nvSRAM
- Fast Ethernet, 10/100Base-T
- PMC extension slot
- Two DMA channels

SBS Technologies®

2400 Louisiana Blvd., NE
Albuquerque, NM 87110
Tel: 800-727-1553 • Fax: 505-875-0400

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www.sbs.com

The AVC-cPCI 3000 provides a rugged, yet highly flexible COTS computing platform suitable for a wide variety of avionic, vetronic, and navtronic applications requiring rock-solid reliability. Manufactured by dip brazing aluminum alloy (AlMgSi1), the AVC is both strong and lightweight. At its core, a robust COTS power supply, along with a PowerPC-based RL4 single board computer, easily integrates with other CompactPCI modules to deliver reliable, cost-effective performance.

At 3.5" (H) x 10.75" (W) x 12.8" (L), the AVC-cPCI is well suited for integration into tight spaces that typify rugged environments. External fins provide additional heat-sinking capability, allowing the system to take full advantage of surrounding airflow. To minimize radiative electromagnetic interaction with other systems, the AVC-cPCI utilizes EMI gasketing on both the front and rear panels. In addition, the use of MIL-C-38999 connectors serves to minimize conductive EM emissions and susceptibility.

Compatible with proven operating systems such as VxWorks, the RL4 also features onboard Ethernet, along with serial ports, watchdog timers, and DMA channels. The base configuration includes a 1553 interface, and high-speed serial and discrete I/O modules. For added reliability, SBS utilizes a cPCI transition module instead of a wiring harness.

The Advanced Vehicle Computer is designed to provide effective thermal paths to remove heat primarily through conduction. By careful selection of components, and component placement and mounting, SBS has qualified the AVC to operate in a vacuum at temperatures of up to 71°C.

SBS can provide a broad range of integration services ranging from shock, vibration, and thermal modeling to board level integration, software development, qualification, and acceptance.

For more information, contact info@sbs.com.

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Technologic SYSTEMS

www.embeddedx86.com

TS-5600 Single Board Computer

FEATURES:

- 133-MHz 586 – 32 MB RAM
- PC compatible x86
- PCMCIA socket 10/100Base-T
- 12-bit A/D and DAC options
- Bootable IDE CompactFlash
- 10-pin header provides acess to SPI bus for low-cost attachment of p [what copy is missing here?]
- 23 digital I/O
- Alphanumeric LCD and matrix keypad
- Two RS-232 serial ports (RS-485 available)
- Single +5VDC supply
- PC/104 bus dimensions: 4.3" x 5.6"

New PC compatible SBC features a PCMCIA slot, 10/100Base-T, IDE CompactFlash, 12-bit A/D, 12-bit DAC, digital I/O, and more. The new TS-5600 is based on the 133-MHz AMD 5x86 with 32 MB of onboard high-speed SDRAM (64 MB available). The embedded PC BIOS provides the standard PC BIOS calls and redirects the console to a COM port.

The standard PCMCIA slot supports 802.11b Wi-Fi cards, cellular modems, and a wide variety of card-bus and PC cards, including modems, ATA hard drives, network cards, and various data acquisition cards.

The onboard 10/100Base-T adapter is connected via a PCI bus to provide high-bandwidth connection to Local Area Networks.

The system will boot to an IDE device in the form of CompactFlash. It also provides direct booting for Linux, DOS, QNX, Pharlap, SMX, etc.

Technologic Systems' embedded distribution of Linux can provide complete network connectivity and includes kernel drivers for analog I/O, digital I/O, watchdog timer, etc. TS-Linux is open-source GNU/Linux using a 2.4 kernel and the standard GlibC. Many binaries will copy directly from a desktop system to TS-Linux and will run without modification.

Analog options include an onboard, six-channel 12-bit A/D, and a two-channel 12-bit DAC.

Technologic Systems, Inc.

16610 East Laser Drive, #10
Fountain Hills, AZ 85268
Tel: 480-837-5200 • Fax: 480-837-5300

For more information, contact info@embeddedx86.com.

RSC #51 @ www.embedded-computing.com/catalogrsc

TS-7200 ARM-based SBC

FEATURES:

- 166-MHz Cirrus Logic EP9301 ARM with 32 MB RAM
- 8 MB onboard Flash
- PC/104 bus dimensions: 3.8" x 4.5"
- 10/100Base-T
- Two USB 2.0 full-speed ports
- Two RS-232 serial ports (RS-485 available)
- IDE CompactFlash
- 20 digital I/O pins
- SPI bus header
- Alphanumeric LCD and matrix keypad interface
- Single +5VDC supply – approximately 1.5W
- Eight-channel, 12-bit A/D option

Technologic SYSTEMS

www.embeddedARM.com

The new TS-7200 ARM-based SBC combines the power of Linux on a RISC machine with the expansion capabilities of a PC/104 motherboard in a low-cost solution.

The processor is a Cirrus EP9301 ARM core running at 166 MHz and featuring 32 MB SDRAM and 8 MB of Flash. The RedBoot boot loader performs processor initialization and can provide a serial console for user configuration and development. RedBoot is capable of booting a Linux kernel stored in Flash and can also load a ramdisk file system from Flash. When a larger file system is required, the Compact Flash adapter provides expansion into the Gigabyte range.

The onboard 10/100Base-T adapter enables connection to Local Area Networks or the Internet and can be used to download new kernels and file systems to Flash. Two USB ports provide additional expansion and hot-plug capabilities.

Technologic Systems' embedded distribution of Linux can provide complete network connectivity and includes kernel drivers for analog I/O, digital I/O, alphanumeric LCD, matrix keypad, etc. TS-Linux is open-source GNU/Linux with a 2.4.26 kernel and the standard GlibC cross compiled for ARM.

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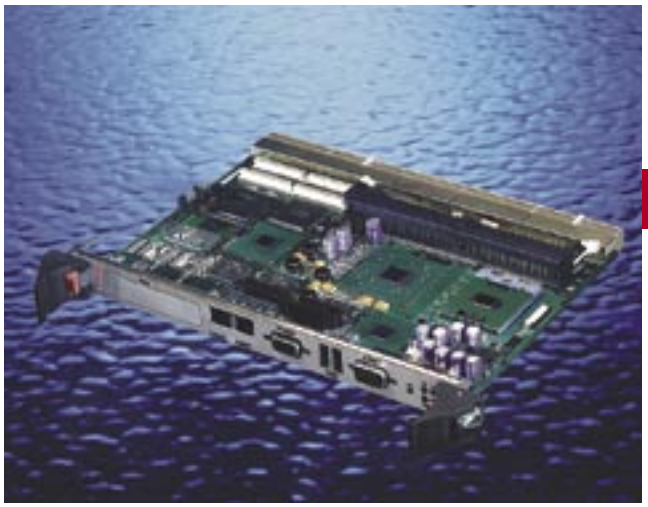

CP16 CompactPCI® SBC

FEATURES:

- Intel® Pentium® M processor – 1.6 GHz to 1.8 GHz (higher speeds as available)
- The Intel® E7501 chipset provides support for DDR200/266 memory
- The CP16 provides direct support for up to seven expansion CompactPCI slots at 32 bits/33 MHz
- The CP16 also provides up to four expansion slots at 64 bits/66 MHz
- PMC 32/64-bit, 33/66/100/133-MHz PCI/PCI-X option cards are supported
- Four 10/100/1000Base-T Ethernet ports; two are used for PICMG 2.16 support
- Local storage options for CompactFlash, Microdrive, and laptop hard drives
- Plug-in socket for a single ECC registered PC1600 or PC2100 DIMM module, 2 GB maximum
- The CompactPCI bus interface is turned off via bus switches in server blade applications
- Optional IPMI (PICMG 2.9, R1.0 support, and optional Dual Ultra320 SCSI)
- Supports hot swap (PICMG 2.1) and hot swap infrastructure (PICMG 2.12, R2)
- CP16 models that support the H110 backplane standard are also available

TRENTON Technology Inc.

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Gainesville, GA 30504
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TRENTON

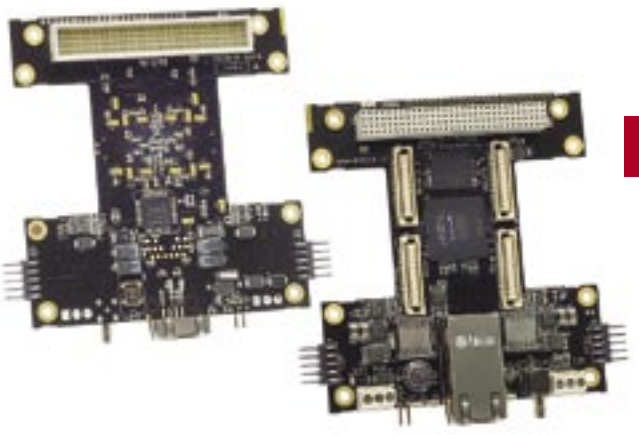
www.TrentonTechnology.com

Trenton's CP16 uses the Intel® Pentium® M processor to provide maximum processing and thermal performance. The processor's micro-architecture and power management features like Enhanced Intel SpeedStep® technology make this possible. Key features designed into the CP16 include a front access PMC slot, local storage options, quad GigE ports and support for up to 2 GB of DDR220/266 memory. A rear transition module, RTM25, is available with or without dual Ultra320 SCSI interfaces and provides rear access to the SBC's I/O ports and status LEDs.

Versatility is one of the hallmarks of the CP16. The SBC complies with a variety of PCI Industrial Computer Manufacturers Group (PICMG®) specifications including Packet Switching Backplane (PICMG 2.16), Hot Swap (PICMG 2.1 and 2.12), and Intelligent Platform Management Interface (IPMI, PICMG 2.9). PICMG compliance and features like a local storage option and the ability to turn off the CompactPCI® bus enable the CP16 to excel in a wide variety of either CompactPCI system board or server blade computing applications.

Like all Trenton products, the CP16 is backed by more than 25 years of embedded computer design experience, quality manufacturing, and fast product deliveries. The CP16 provides improved processing performance at elevated ambient temperatures while maximizing CompactPCI system reliability. Advanced storage, CompactPCI bus flexibility, and PICMG 2.16 support give the CP16 the versatility needed to operate as either a system board or as a server blade. The CP16's I/O features maximize system flexibility over a wide variety of network communication and device interface application requirements. Innovations such as expanded video capability make the CP16 an excellent choice for applications that have a wide variety of system requirements.

For more information, contact jrenehan@TrentonTechnology.com. RSC #53 @ www.embedded-computing.com/catalogrsc



FPGA104 & FPGA-PCI104

FEATURES:

- Altera Cyclone FPGA, 275-MHz core speed
- 4K, 12K, or 20K logic elements
- FPGA configured via onboard EEPROM, PC/104 bus, or JTAG cable
- Four symmetrical expansion connectors support four I/O daughterboards
- Total of 112 pins available for various digital and/or analog interface functions
- Onboard 50-MHz oscillator; SMB connector for external reference frequency source
- Onboard real-time counter/clock
- Onboard unique silicon number
- Operating temperature: 0°C to +85°C

Tri-M Systems Inc.

1407 Kebet Way, Unit 100
Port Coquitlam, BC V3C 6L3 Canada
Tel: 800-665-5600 • Fax: 604-945-9566

TRI-M SYSTEMS · ENGINEERING

www.tri-m.com

The FPGA104 & FPGA-PCI104 are field programmable gate array building platforms that are based on the Altera Cyclone FPGA family: 4K, 12K, or 20K logic element parts. Altera's free Quartus-II basic FPGA design software can be used by solution providers to define the circuit/system functions to be implemented by Tri-M Engineering's FPGA product family.

The FPGA104 & FPGA-PCI104 support up to four daughtercards, with each card location supporting interfaces with up to 28 I/O signals. Each daughtercard location is symmetrical. Daughtercards can encompass one or more daughtercard locations for greater I/O. For example, the FPDB-DEV uses all four daughtercard locations and has access to 112 I/O signals.

The FPGA104 is PC/104 compliant and is interfaced to the full PC/104 bus signals including memory and I/O mapped signals. The FPGA-PCI104 is PCI-104-compliant and has a full PCI 2.3 interface.

The onboard FPGA is configured via the onboard EEPROM, ISA/PCI bus, or the JTAG port. The configuration EEPROM can be programmed, independently of the FPGA, over the PC/104 bus, the PCI-104 bus, or via the JTAG port.

The FPGA104 and PCI104 have an onboard real-time counter/clock with SuperCap backup and a unique, read-only, 64-bit serial number ROM.

Included on the FPGA104 and FPGA-PCI104 are the connectors and physical layer circuits for 10/100Base-T and optionally for a 10/100/1000Base-T GIGJACK port, and an I2C/SMBus. Also included are a 50-MHz oscillator and an SMB connector for an external reference frequency source.

The FPGA104 and FPGA-PCI104 are powered from the ISA/PCI bus, or external 6-18VDC supply. Temperature range is 0°C to +85°C.

For more information, contact info@tri-m.com.

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VRM-CC9-X and VRM-CD2-X

FEATURES:

VRM-CC9-X:

- CHIPSET: Intel® i855 consisting of 82855 (GMCH), 82801D Controller Hub (ICH4), and 82802 (FWH)
- I/0: Onboard LPC/AC97 Super I/O, USB 2.0 overcurrent protected, audio interface connector, and 1 GB Ethernet
- COMPACT PCI: 32-bit PCI bridge chip PLX PCI 6150 (HB4), 133 MBps CompactPCI master

VRM-CD2-X:

- MEMORY: 200-pin SO-DIMM socket (notebook style module), PC2100/2700 DDR 266/333-SDRAM, 1 GB maximum
- NETWORK: Three independent Gigabit Ethernet controllers (82541); one Fast Ethernet controller (82562); PICMG® 2.16
- STORAGE: Ultra ATA/100 connector; dual serial ATA controller, onboard 2.5" hard-disk module, and onboard USB 2.0 FLASH
- I/O: Onboard LPC/USB/AC97 Super I/O, USB, and audio expansion interface connector
- VIDEO: Analog monitor and digital flat-panel display support by DVI-I connector (front panel)
- Hot Swap controller, PICMG 2.12 Rev. 2.0

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www.vrosemicrosystems.com & www.ekf.de

VRM-CC9-X

This 4HP/3U CompactPCI Pentium® M CPU, alternatively equipped with the Intel® series of (LV) Pentium® M or ULV Celeron® M processors, is designed especially for systems that require low power consumption and is available with a variety of processors, starting with the ULV 600-MHz Celeron® M up to the 1.8-GHz Pentium® M Dothan 745. The memory comprises a 200-pin SO-DIMM socket (notebook style module), with PC2100/2700 DDR266/333 SDRAM, 1 GB maximum. The DVI-I video interface enables attachment of both advanced (digital) and legacy (analog) flat-panel displays and CRT monitors (D-SUB connector, optionally). The VRM-CC9-X is provided with a GigE controller. The onboard CompactFlash socket allows for utilization of an ATA Flash card or IBM Microdrive®. A local expansion interface connector may be used to directly attach a mezzanine companion I/O board, which can also carry a hard disk drive. As an option, rear I/O across the J2/P2 connector is available.

VRM-CD2-X

This low-power, 6U CompactPCI® CPU board with the Intel® Pentium® M processor features an embedded graphics controller. The user can choose between a DVI-I receptacle or the classic VGA D-Sub connector. The Pentium® M (in particular, the low-voltage, 1.4-GHz chip) reduces the power consumption considerably compared to previous processor generations. The VRM-CD2-X is equipped with several USB 2.0 ports and four independent Ethernet controllers for high-speed networking up to 1000 Mbps. The PICMG 2.16 Packet Switching Backplane is also supported (Dual Link Port). For mass storage attachment, the VRM-CD2-X provides both Ultra ATA/IDE and S-ATA interfaces and a CompactFlash socket. A bootable onboard USB 2.0 Flash disk drive, up to 2 GB, is available as an option. Some additional options are rear I/O, PMC mezzanine card socket, or an onboard hard disk drive.

For more information, contact sales@vrosemicrosystems.com. RSC #55 @ www.embedded-computing.com/catalogrsc

Cobra Pentium® M SBC

FEATURES:

- High-performance/low-power, 1.6-GHz Intel® Pentium M processor
- Extreme Graphics 2 chipset for high-resolution/ high-performance graphics
- 2-GB, high-speed DDR RAM capacity (in latching SODIMM sockets)
- 32 lines of TTL digital I/O standard
- Eight channel, 12-bit analog I/O option with interrupt capability
- 10/100Base-T or 10/100/1000Base-T
- Four USB ports with support for USB 1.1 and 2.0 devices
- Industry-standard EBX form factor with PC/104-*Plus* expansion site
- Simplified cabling with external paddle boards
- OEM-enhanced, field-upgradeable BIOS with reconfigurable defaults
- Scalable speed and power settings, 600 MHz to 1.6 GHz
- CompactFlash socket offers non-volatile onboard memory

VersaLogic Corp.

3888 Stewart Road
Eugene, OR 97402
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VERSALOGIC CORPORATION

www.VersaLogic.com

For very-high-performance applications, the EBX format "Cobra" is the answer. It combines a Pentium M processor with other high-throughput chips, to bring very-high-speed processing to this embedded platform. In addition, it boasts lower power (12-24W typical) than other boards in its class. With its 1.6-GHz Pentium M CPU, this impressive board outperforms 2.5-GHz Pentium IV products in benchmark tests for performance and power efficiency. Applications run faster and smoother with high-resolution graphics support and advanced memory allocation provided by the chipset and high-speed DDR RAM.

The Cobra can be run as a complete system without the need for additional boards or storage devices. It offers considerable onboard I/O, including dual GigE and analog/digital industrial I/O. Easy stacking expansion off the PC/104-*Plus* connector enables customized device integration and versatile system configurations. A CompactFlash socket provides convenient onboard removable media storage for nonvolatile memory needs.

An OEM-enhanced BIOS allows user control over default settings, field upgrades, boot device selection (including CD-ROM), and CPU speed settings. The Cobra is priced competitively at under $2,000 in OEM quantities and is currently available from stock.

About VersaLogic

A leading supplier of industrial computers since 1976, VersaLogic focuses on high-quality board level products for embedded OEM applications. Product lines include PC/104, PC/104-*Plus*, EPIC, EBX, and STD 32 bus. Our five-year product availability guarantee and outstanding warranties demonstrate a commitment to service. Industry-wide surveys recently rated our company a "Platinum" level embedded board vendor (VDC embedded customer survey, last two years running). Visit our website at www.VersaLogic.com for more details.

For more information, contact info@VersaLogic.com.

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Jaguar PC/104-*Plus* SBC

VersaLogic Corporation

www.VersaLogic.com

FEATURES:

- Celeron or Pentium processors, 350 MHz to 850 MHz
- AGP video with flat-panel support/LVDS output
- Up to 256 MB RAM in high-reliability latching DIMM socket
- Extended temperature and low-power versions
- Two 10/100Base-T ports
- Two USB ports
- Two COM ports
- TVS devices on the user I/O to protect the board from ESD damage
- Industry-standard EBX form factor with PC/104-*Plus* expansion site
- OEM-enhanced, field-upgradeable BIOS with reconfigurable defaults
- Scalable CPU speed settings for lower power consumption
- 32-pin DiskOnChip socket for onboard, non-mechanical storage

The Jaguar is the best choice for applications where high performance is needed but space is at a premium. The compact, two-board PC/104-*Plus* module fits in tight spaces and still allows for additional PC/104-*Plus* expansion. Extended temperature and low-power versions are available for rugged environments and portable applications. Processor selections include a low-power 350-MHz Celeron, a 566-MHz Celeron, and an 850-MHz Pentium III. Board features include up to 256 MB SDRAM, DiskOnChip Flash, and video with flat-panel support. The Jaguar is designed for high reliability with built-in features such as TVS devices on the user I/O to protect the board from ESD damage and a CPU temperature sensor. The programmable CPU temperature sensor output can be used to turn on additional fans, create local or remote warnings, or take other action through software triggers. In addition, the CPU's effective operating speed can be "throttled back" to decrease the board's overall power draw. An OEM-enhanced BIOS allows user control over default settings, field upgrades, boot device selection (including CD-ROM) and CPU speed settings. The Jaguar is priced competitively at about $1,000 in OEM quantities and is currently available from stock.

About VersaLogic

A leading supplier of industrial computers since 1976, VersaLogic focuses on high-quality board level products for embedded OEM applications. Product lines include PC/104, PC/104-*Plus*, EPIC, EBX, and STD 32 bus. Our five-year product availability guarantee and outstanding warranties demonstrate a commitment to service. Industry-wide surveys recently rated our company a "Platinum" level embedded board vendor (2002 and 2003 VDC studies). Visit our website at www.VersaLogic.com.

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3888 Stewart Rd.
Eugene, OR 97402
Tel: 541-485-8575 • Fax: 541-485-5712

For more information, contact info@VersaLogic.com.

RSC #57 @ www.embedded-computing.com/catalogrsc

VSBC-8 EBX SBC

FEATURES:

- Celeron or Pentium processors, 350 MHz to 850 MHz
- AGP video with flat-panel support/LVDS output
- Up to 256 MB RAM in high-reliability latching DIMM socket
- 16 lines of opto-22 compatible industrial I/O
- Eight-channel, 12-bit analog I/O option with interrupt capability
- Two 10/100Base-T ports
- Two USB ports
- TVS devices on the user I/O to protect the board from ESD damage
- Industry-standard EBX form factor with PC/104-*Plus* expansion site
- OEM-enhanced, field-upgradeable BIOS with reconfigurable defaults
- Scalable CPU speed settings for lower power consumption
- 32-pin DiskOnChip socket for onboard, non-mechanical storage

VersaLogic Corp.

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VERSALOGIC CORPORATION

www.VersaLogic.com

The VSBC-8 is an excellent choice for OEM applications requiring fast processing and industrial I/O. The compact EBX board size, flexible configuration, range of processor options, and extended temperature/low power versions make it an extremely versatile board that works well in a large variety of applications. Processor selections include a low-power 350-MHz Celeron, a 566-MHz Celeron, and an 850-MHz Pentium III. Board features include up to 256 MB SDRAM, DiskOnChip Flash, video with flat-panel support, audio, industrial I/O, and PC/104-*Plus* expansion. The VSBC-8 is designed for high reliability with built-in features such as TVS devices on the user I/O to protect the board from ESD damage and a CPU temperature sensor. The programmable CPU temperature sensor output can be used to turn on additional fans, create local or remote warnings, or take other action through software triggers. In addition, the CPU's effective operating speed can be "throttled back" to decrease the board's overall power draw. An OEM-enhanced BIOS allows user control over default settings, field upgrades, boot device selection (including CD-ROM), and CPU speed settings. The VSBC-8 is priced competitively at under $900 in OEM quantities and is currently available from stock.

About VersaLogic

A leading supplier of industrial computers since 1976, VersaLogic focuses on high-quality board level products for embedded OEM applications. Product lines include PC/104, PC/104-*Plus*, EPIC, EBX, and STD 32 bus. Our five-year product availability guarantee and outstanding warranties demonstrate a commitment to service. Industry-wide surveys recently rated our company a "Platinum" level embedded board vendor (2002 and 2003 VDC studies). Visit our website at www.VersaLogic.com for more details.

For more information, contact info@VersaLogic.com.

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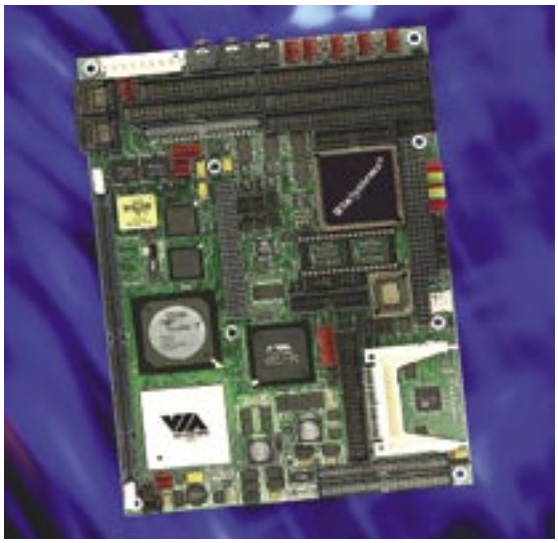

EBX SBC with Video and Dual Ethernet

FEATURES:

- 733-MHz or 1-GHz low-power C3 processor
- x86-compatible, EBX-compliant SBC
- Dual 10/100Base-T and four USB controllers
- High-resolution video controller with CRT and LVDS flat-panel support
- 48 bidirectional TTL digital I/O lines
- Four RS-232 serial ports with FIFO, COM1, and COM2 with optional RS-422/485/J1
- Two, dual Ultra DMA/100 EIDE hard drive connectors
- Floppy disk controller supports one or two drives
- Bidirectional LPT port supports EPP/ECP
- Supports 32 to 512 MB of system SDRAM
- Socket for up to 1 GB DiskOnChip® or CompactFlash
- Operating temperature of –40°C to +85°C

WinSystems, Inc.

715 Stadium Drive
Arlington, TX 76011
Tel: 817-274-7553 • Fax: 817-548-1358

WinSystems

www.winsystems.com

WinSystems' EBC-C3 is an EBX-compatible, Pentium-based SBC offering a wide operational temperature range. It balances the conflicting goals of high performance without fans for cooling the CPU/chipset for industrial-grade SBCs.

The EBC-C3 gives engineers a high-performance, cost-effective, and low-power x86 engine for computational-demanding applications in heavy manufacturing, COTS/military, transportation, pipeline, networking, and machine control.

Configured with a 733-MHz or 1-GHz CPU, the EBC-C3 comes equipped with two 10/100Base-T Ethernet controllers, advanced 4X AGP flat-panel/CRT video support, four RS-232 serial channels (two of which also support RS-422/485/J1708 levels), 48 digital I/O lines, AC97 audio controller, and the standard AT peripheral feature set.

It supports expansion with PC/104 and PC/104-*Plus* connectors and with USB. The EBC-C3 board measures 5.75" x 8.0". It requires only +5V and typically draws 3.3 amps with 256 MB of SDRAM installed.

The EBC-C3 is designed to run both 16-bit and 32-bit x86 instruction set software. It is compatible with Microsoft's Windows® CE and XPembedded systems along with the applications that run on them. It also supports Linux and other PC-compatible x86 operating systems such as QNX and VxWorks.

Its PC software compatibility assures easy program development and checkout. Delivery is from stock to three weeks. Visit http://www.winsystems.com for additional product information.

The data sheet is located at http://sbc.winsystems.com/products/sbcs/ebcc3plus.html.

For more information, contact info@winsystems.com.

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SYSTEMS ON MODULES

MEN EM05 w/TM5900

FEATURES:

- 800-MHz Transmeta Crusoe TM5900 microprocessor
- SO-DIMM slot for up to 512 MB DDR RAM, 4 MB Flash, and 4 Kb Serial EEPROM
- CompactFlash socket and IDE port for hard-disk drives
- Two 10/100Base-T ports with two RJ-45 connectors or single nine-pin D-Sub connector
- Two RS-232 serial interfaces (COM1/COM2) with two RJ-45 connectors or single nine-pin D-Sub connector
- Onboard ALTERA FPGA allows configuration of custom I/O with no hardware redesign

men micro, inc.

www.menmicro.com

The MEN EM05 is a complete embedded single-board computer for industrial applications. The EM05's 800-MHz Crusoe TM5900 from Transmeta is Pentium-like with an integrated Northbridge. The TM5900's low power (typically < 5W) and long-term availability (> 5 years) makes it especially attractive to OEMs in the industrial, medical, transportation, and commercial sectors. The EM05 has sockets for DDR RAM SO-DIMM and CompactFlash. On the front panel are two RS-232 serial ports and two Fast Ethernet ports, with either RJ-45 or nine-pin D-Sub connectors. Other I/O: USB, IDE, and PS/2 ports can be routed to the I/O connector of the EM05 by means of an FPGA. I/O connectors are available on a carrier board. Additional I/O such as serial interfaces, CAN bus controllers, protocol converters, touch controllers, etc., can also be implemented in the FPGA.

MEN Micro, Inc.
PO Box 4160
Lago Vista, TX 78645-4160
Tel: 512-267-8883 • Fax: 512-267-8803

For more information, contact egodsey@menmicro.com.

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There are better ways to cool your application.

We promise.

Improve Design Efficiency with Radian's Tailored Thermal Support:
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- Resolve Special Form, Fit & Weight Issues
- Optimize Solutions for Cost-effectiveness
- Identify & Eliminate Troublesome Hot Spots

Custom Cooling Solutions by Radian Heatsinks:
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- Tailored Design Engineering Assistance
- Rapid Prototyping Technologies
- Short-run & Volume Production
- Versatile Processes & Capabilities

Radian Heatsinks A division of Intricast Company, Inc.
tel: 800.689.2802 radiansales@radianheatsinks.com
fax: 408.988.0683 http://www.radianheatsinks.com

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A time of unprecedented innovation, performance, and investment protection.

You don't have to be a grape-haired god to benefit from Motorola's VME Renaissance. You just have to be ready to profit from the incredible boost in VMEbus technology and performance.

This ain't the kind of Renaissance where people sculpt statues. But it is the kind where Motorola develops a PCI-X to VMEbus bridge ASIC.

It's an era that nurtures the addition of a switched serial data plane interconnect to VMEbus. That means standard, open technologies such as PCI Express, Serial RapidIO, and 10 Gigabit Ethernet can communicate across your VME backplane.

You may be thinking, yea, it works better, but what about products I've already invested in? Don't get your toga in a twist – the VME Renaissance helps make VMEbus systems eight times faster and more powerful, while still being backwards compatible. You don't have to start over with every new project.

And you can upgrade smoothly between new technology and legacy products exactly when it's best for your business. That gives you a better ROI.

You get power, performance, speed, flexibility, and investment protection. That's the VME Renaissance, man.

It's the renaissance, man.

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One size doesn't fit all

By Jeffrey Russell, Carlo Gavazzi Mupac, Inc.

The electronic packaging industry in North America is facing new challenges from a plethora of new VITA and PICMG specifications and the wider adoption of white boxes. System packaging customers are attracted to white boxes for their ever-increasing capabilities and low cost. However, markets such as military and telecommunications still require specialized packaging for embedded systems. In these cases, one size doesn't fit all.

The electronic packaging industry is facing the increasing challenge of adhering to strict guidelines within VITA and PICMG specifications while still meeting custom requirements. Ironically, the larger the spec means more room for variation and a greater opportunity for customization within the electronic packaging industry.

Early specifications, like the VME and MultiBus, focused on the bus architectures. Today's specifications from PICMG define the mechanics in a much greater way. Beyond the bus and mechanical elements, recent specifications define system and shelf management details leading to a perception that there will not be a need for proprietary solutions. In contrast, CG Mupac believes there are still many opportunities for custom electronic packaging solutions within the new standards.

During the recent economic slowdown, CG Mupac saw customers, especially in the military sector, extending the life of existing programs and selectively starting new programs with mature technologies like VME. The adoption of the newer PICMG specifications was minor during this period. Likewise, we found that our customers were looking to a single vendor to outsource their highly integrated packaging solutions because of their reduced staffing levels and constrained internal resources. Fortunately, we have seen a greater willingness throughout the past six months to adopt and invest in new technologies as programs ramp up.

Resurgence of VME

Despite the consideration of VME being on the decline in recent years, it has had a healthy resurgence due to its advancements – from VME64 extensions through the new VITA fabric specs. For example, the ability for additional I/O through the P0 connector has been a critical enhancement. We have noticed military adoption of the PICMG specs but we continue to see new programs requiring VME and custom packaging solutions.

The marketplace, especially in North America, demands that electronic packaging companies maintain an expertise in the MIL specifications and be able to package both MIL spec and commercial components that meet MIL shock, vibration, and ruggedization requirements.

CG Mupac's series of ATR chassis is a good example of a product that is designed to meet the requirements of the ARINC 404A/MIL-STD-91403. We determined that we could supply products with market differentiators while maintaining the integrity of the MIL spec. Through an innovative heat spreader, we have achieved up to 135W of power from the power supply while the chassis is at 50ºC. During the design process of this chassis, we employed thermal simulation to optimize the size and location of the heat spreaders, which are responsible for conducting heat away from the chassis' power supply and board area. A second innovation against the long-standing specification was the chassis' internal rack infrastructure, designed to support the popular DIN mechanical specification, which enables our ATR chassis to fit with VME, VME64X, and CompactPCI backplanes.

New telecom specification: AdvancedTCA

Like the military sector, the telecom industry is seeing customization start where the mechanical standards end. As the telecom market rebounds, the long-standing Nebs and ETSI Telco packaging standards are not only intact, but also are complemented by the AdvancedTCA specifications.

CompactPCI met many, but not all, of the telecom requirements and came to fruition at a difficult time in our economy. AdvancedTCA is the first PICMG specification developed specifically to meet telco and central office needs. 2004 has seen the maturation of the AdvancedTCA specifications and many

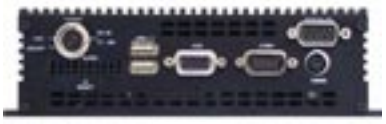
"The marketplace, especially in North America, demands that electronic packaging companies maintain an expertise in the MIL specifications and be able to package both MIL spec and commercial components that meet MIL shock, vibration, and ruggedization requirements."

Embedded Computer Solutions For Harsh Environments
-40°C to 85°C Operating Temperature

Five year product availability guarantee

Rugged Embedded Computer for In-Vehicle / Marine Applications

800Mhz ~ 1.26Ghz CPU
Pentium III / Celeron



Back View

Front View

- 128MB~512MB SDRAM
- **10/100Base-T port**
- (4) USB 2.0 ports, (2) USB 1.1 ports
- (2) serial ports, Video Interface
- 30Gbytes ~ 80Gbytes Hard Drive
- Compact Flash up to 6 Gbytes
- Extrudded Aluminum case
- Audio port
- -20°C ~ 60°C operating temperature
- 5.75" x 7.25" x 2.0" form factor
- **Operated from 7V ~ 28V DC-IN**

EP301V is a High Performance Pentium III based rugged Embedded computer designed for In-Vehicle / Marine applications.

It's DC-DC converter is designed to operate from +7V ~ 28V DC-IN and can be used in Cars, Trucks, Buses, Trains or Boats.

This unit is packed in a very small extruded aluminum case (5.75" X 7.25") for space constrained applications.

Pentium III EBX SBC designed for Mobile and Outdoor Applications

- 500MHz to 1.26GHz Pentium III CPU
- Ultra low power
- Passive Heat Sink for CPU up to 900MHz
- 14W (using 900Mhz CPU, 256K L2 cache)
- -40°C to +85°C operating temperature

- Soldered Onboard 256MB SDRAM (Optional 768MB with SODIMM)
- CompactFlash Disk (up to 6 Gbytes)
- LCD/CRT Video, 10/100Base-T Ethernet interface, AC'97 Audio, TV Out
- 6 serial ports, dual USB, 256 Bytes EEPROM, 64-bit unique electronic ID
- 128/512Kbytes battery backed SRAM with 10 years data retention
- Intelligent thermal management with independent microcontroller
- Less than 4 seconds boot up time
- 8" x 5.75" standard EBX form factor
- Supports DOS, Windows 98, NT, 2000, XP, CE, QNX, pSOS, Linux, VxWorks

tme

Toronto MicroElectronics Inc.
5149 Bradco Boulevard, Mississauga, ON., Canada L4W 2A6
Tel: (905) 625 - 3203 ~ **Fax:** (905) 625 - 3717
sales@tme-inc.com ~ www.tme-inc.com

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One size doesn't fit all

new product offerings at the board and packaging levels. As a founding member of the Pigeon Point Sentry Shelf Management Consortium, CG Mupac has been able to provide and deploy complete packaging solutions in various configurations for the past year.

The AdvancedTCA specifications have stressed the critical nature of shelf management to all packaging solutions. Looking forward, we expect AdvancedTCA to address more than 80 percent of next-generation telecom applications. From a two-slot dual star to a 20-slot full mesh configuration with redundant power supplies, the possibilities with AdvancedTCA are endless.

Even in the context of ever-more explicit standards, there will be hundreds, if not thousands, of custom requirements against the specifications. Like others in the electronic packaging field, CG Mupac cannot ignore the movement toward offshore manufacturing for reduced pricing and the commoditization of electronic packaging. We must embrace the new role we play in the embedded industry and evolve to meet its needs. We must remain committed to the standards organizations and continue to drive specifications as we work to exceed the specs in partnership with our customers.

"From a two-slot dual star to a 20-slot full mesh configuration ... the possibilities with AdvancedTCA are endless."

***Jeffrey Russell** joined Carlo Gavazzi Mupac, Inc. in 1986 where he has held various positions in engineering, sales, and marketing. He holds a degree in mechanical engineering and is the company's President and CEO since 1993.*

***CG Mupac** specializes in standard or custom AdvancedTCA, CompactPCI, PCI/ISA, and VME electronic packaging solutions. For more details about the company, its products, and services, visit* www.cgmupac.com.

Brand or product names are registered trademarks or trademarks of their respective holders.

BACKPLANE

Model 5004 CPCI BP

FEATURES:

- LH "system-only" slot, five "peripheral + single-link port node" slots, and one "fabric-only" slot
- Supports full-duplex, single-pinout data rate of 10~1000 Mbps up to two links per slot, and 2000 Mbps per slot
- Jumper selectable shelf address
- Supports both CompactPCI bus and CompactPCI/PSB link-ports hot swap
- Supports high availability functionality defined by PICMG® 2.1
- Utility headers mounted on backside of PCB provide monitoring of tach fans, temperature sensors, and system voltages

Dawn VME Products®

www.dawnvme.com

Model 5004 is the newest model in Dawn's CompactPCI 2.16 Packet Switching Backplane series that also complies with PICMG's 2.0 Rev. 3.0 specification. This model features seven total slots comprising a system-only slot, a fabric-only slot, and peripheral+ node slots. Onboard utility headers provide direct connection to tach fans, temperature sensors, and all output voltages, reducing chassis cabling complexity. Power is delivered to the backplane via heavy-duty power bugs and an "ATX" connector. As with all Dawn backplanes, Model 5004 contains a generous amount of decoupling capacitors. PCB construction is microstrip/stripline with 2-oz. copper planes to reduce voltage drop. Contact Dawn for pricing.

Dawn VME Products
47915 Westinghouse Drive
Fremont, CA 94539
Tel: 510-657-4444 • Fax: 510-657-3274

For more information, contact jmarceca@dawnvme.com.

RSC #6501 @ www.embedded-computing.com/catalogrsc

BACKPLANE

CPCI 2.1 R3.0 Series

FEATURES:

- 3U and 6U models available from stock
- Two through eight slots standard
- User-selectable VI/O via power bugs on backplane: +3.3VDC or +5VDC
- Power delivery system: power bugs, bus-bar (selected models) and "ATX" style connector (selected models)
- 47-pin power connector models comply with PICMG® Power Interface Spec 2.11 R1.0 and support hot plug power systems up to 600W
- Custom CompactPCI™ backplane and/or chassis designs are welcome; contact Dawn with your specification/requirements

Dawn VME Products®

www.dawnvme.com

As a leader in CompactPCI™ backplane technology, Dawn's 2.1/R3.0 Series features slot counts from two through eight, with models offering left-hand or right-hand system slots. All but the two-slot model comes in a 6U height; the two-slot model, specially designed for Dawn's popular 1U-high Model 6100 "blade" chassis, is approximately 8U. Additional peripheral headers, such as tach fan and temperature sense, are installed on this two-slot model to reduce cabling complexity within Model 6100. All models feature jumper-selectable 3.3V or 5V (I/O) power bugs for high-current delivery, and a 20-pin connector to facilitate direct connection to an ATX power supply. Most models are shipped from stock.

Dawn VME Products
47915 Westinghouse Drive
Fremont, CA 94539
Tel: 510-657-4444 • Fax: 510-657-3274

For more information, contact jmarceca@dawnvme.com.

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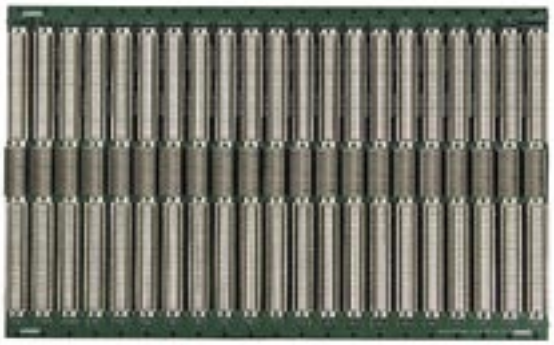
BACKPLANE



9000 Series

FEATURES:

- Available in 2 to 21 slots; choice of power feeds
- Meets or exceeds ANSI/VITA 1.1-1997, VME Extensions
- Optimized signal line impedance using microstrip/stripline PCB construction
- Models may be ordered with or without J0 I/O connectors
- Manual or automatic electronic BUSGRANT/IACK jumpering
- Design allows multiple backplanes in a single chassis without loss of slots

Dawn VME Products®

www.dawnvme.com

Dawn's monolithic VME64x backplanes are fully compliant with the ANSI/VITA VME Extensions standard. This includes all connectors, signal routing and termination, the test and maintenance bus, geographic addressing, and power connection, including +5V, +3.3V, ±12V, ±V1, ±V2, and VPC, all on a monolithic printed circuit board. With today's high-speed systems and many layers associated with most backplanes, a slot antenna can result near the board edge when adjacent layers operate at different potentials. Dawn's VME64x backplane family features our exclusive DawnWrap EMI/RFI reduction technology. This unique system encases the backplane in copper to eliminate noise interference.

Dawn VME Products
47915 Westinghouse Drive
Fremont, CA 33543
Tel: 510-657-4444 • Fax: 510-657-3274

For more information, contact jmarceca@dawnvme.com.

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BACKPLANE

12U ATCA Chassis

FEATURES:

- 19" rack mount, fully compliant to PICMG 3.0. 12U x 444mm x 385mm (H x W x D)
- NEBS-ready, STP-compliant construction; 14-slot dual star backplane, 2 HMB, 12 node slots
- Cooling front to rear; 200 watts per slot (30 watts per slot, rear I/O)
- 3 x plug removable dual fan trays below the cards; 3 x plug removable single fan trays above cards
- Dual 48VDC input power entry modules (100 amps); dual plug removable shelf managers
- 500 LFM per slot (40 CFM); 15°C maximum rise

ELMA
Your Solution Partner

www.elma.com

With the development of Elma's newest PICMG 3.0-compliant 12U ATCA chassis, the company now has four enclosure models with various configurations in 4U, 5U, 12U, and 13U heights and includes a wide range of backplane, shelf management, and other options. The backplane includes a 14-slot dual star configuration with a section below the cards for plugging in power entry modules and fan trays. Elma incorporates its modular design and creative concepts to offer the most flexible, high performance AdvancedTCA products on the market. Visit www.elma.com for more information about the company's AdvancedTCA chassis, backplanes, shelf managers, and accessories. Order No. 11A14FGXC8Y4VMXX.

Elma Electronic Inc.
44350 Grimmer Blvd.
Fremont, CA 94538
Tel: 510-656-3400 • Fax: 510-656-3783

For more information, contact sales@elma.com.

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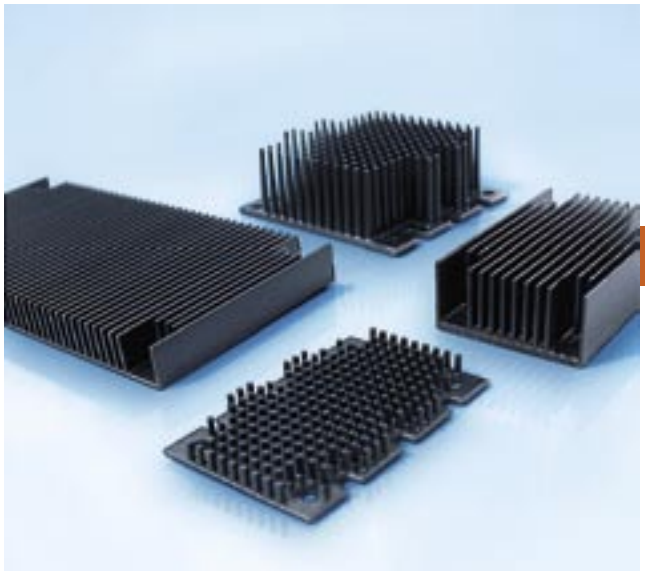

DC/DC Converter Heatsinks

radian

www.radianheatsinks.com

Radian's DC/DC Converter Heatsinks are optimized to effectively cool and enhance converter reliability in a broad range of environments. These cost-effective, high-efficiency thermal solutions are available in various pin shape, size, and height combinations.

FEATURES:

- Aluminum heatsinks offered in convenient quarter, half and full brick sizes to fit most DC manufacturers
- Standard heights available in 0.23", 0.45", 0.70", and 0.90" to meet diverse power, volume, and density requirements
- Counter-bored heatsinks guarantee greater contact to mounting surface for optimum thermal transfer
- Black anodized plating offers enhanced protection in harsh environments and better performance in natural convection
- Optional mounting kits and interface pads available for all DC/DC converter heatsinks
- Complete DC product catalog available at www.radianheatsinks.com; small quantities available through www.radianstore.com
- Contact Radian for volume pricing and custom solutions

Round pin DC/DC Heatsink Series:

- Ideal when airflow is omni-directional, uncertain, or less than 300 lfm, and air pressure drop is not a concern

Plate Fin DC/DC Heatsink Series:

- Fins available in two different orientations, with fin thicknesses from 0.30"-0.35" and aspect ratios up to 12:1
- Ideal when airflow is 200 lfm to 300 lfm

Versatile applications

Offered in round pin and plate fin configurations, Radian's DC/DC Heatsinks are conveniently sized to fit quarter-brick, half-brick, and full-brick converters from most manufacturers. Standard heights start at 0.23" to 0.90" to accommodate various space limitations.

Optimal thermal performance

When airflow is omni-directional, uncertain, or less than 300 lfm, and air pressure drop is not a concern, Radian's round pin designs can optimize heat dissipation, with minimal impact on the converter's operational efficiency. In these environments, round pins may outperform plate fin alternatives by more than 10 percent. Radian's Plate Fin Heatsinks are available in two fin orientations. These designs are ideal when airflow ranges from 200 lfm to 300 lfm. Cutting-edge extrusion technology is used to deliver fin thickness from 0.030"-0.035" and high aspect ratios up to 12:1. Counter-bored through-holes ensure easy installation and improved contact with the mounting surface for optimum thermal transfer.

Tailored design and engineering support

Radian offers complementary CFD analysis services, Rapid Prototyping, and tailored engineering assistance to meet specific application requirements. For custom designs, RP technologies are used to deliver metal prototypes in one to three weeks. Radian is equipped with a comprehensive range of capabilities, including die and investment casting, fin skiving, precision forging, high aspect ratio/thin fin extrusion, and machining, to provide maximum design flexibility and cost-effective production.

Radian Heatsinks,
a division of Intricast Company, Inc.
2160 Walsh Avenue
Santa Clara, CA 95050-2512
Tel: 800-689-2802 • Fax: 408-988-0683

For more information, contact radiansales@radianheatsinks.com.

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765 Series Versatile Powered Enclosure

FEATURES:

- VECTORBORD cPCI, VME64, VME64X backplanes
- 250W to 1,200W power options
- IEEE 1101.10-compliant
- Optional 80mm rear transition
- Ruggedized EMI/RFI versions
- 3.5" and 5.25" drive options
- Choice of many standard factory colors
- Custom modification (contact factory)

VECTOR ELECTRONICS & TECHNOLOGY, INC

www.vectorelect.com

Vector's new 765-series chassis accepts horizontal cards (VME64 and CompactPCI) and is IEEE 1101.10-compliant. 5U-high design includes a deep 6" recess for cabling and sliding cableway ports on either side of card rack. Standard 19" width and rackmount handles and slides optional. PUSH/PULL fans provide most efficient cooling. Available in a wide range of CompctPCI and VME backplane configurations including PICMG 2.0, R3, H110, VME64X (160-pin), and standard VME64 96-pin up to 12 slots. Power options are 250W to 1,200W. Shown with removable HDD installed, Vector manufactures all chassis and backplanes in the US and boasts the shortest lead times. We offer excellent 1-800-423-5659 factory support. Contact VECTOR for your next packaging requirement.

Vector Electronics & Technology

11115 Vanowen Street
North Hollywood, CA 91605
Tel: 818-985-8208 • Fax: 818-985-7708

For more information, contact info@vectorelect.com.

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MX8 Single Board Computer

FEATURES:

- Intel® Pentium® 4 processor at speeds of 2.0 GHz to 3.4 GHz
- Intel® Celeron® or Intel® Celeron® D processor at speeds of 2.0 GHz to 2.5 GHz (higher speeds as available)
- The MX8 uses the Intel® 875P chipset featuring Intel® PAT & Intel® CSA
- 400/533/800-MHz front-side bus (FSB) dual channel DDR266/333/400 memory
- AGP 3.0 video interface with 4x data transfers and 16 MB of video memory
- Features Intel's E6300ESB I/O controller hub, USB 2.0, dual 10/100/1000Base-T Ethernet ports, PCI-X/PCI, and ISA
- Supports PCI-X, PCI, and ISA cards, and PCI-X/PCI bus interface speeds at 32/64 bits, 33/66 MHz
- Memory interface operates as either a single-channel or dual-channel DDR
- 2 GB of maximum memory, PC2100, PC2700, or PC3200 unbuffered 184-pin ECC or non-ECC
- Dual-channel DDR interface operation occurs by installing two identical DIMMs
- The two DIMMs double the interface bandwidth to 4.2 GBps, 5.4 GBps, or 6.4 GBps
- Available with an optional Ultra160 SCSI interface, dual EIDE UltraATA/100, and dual Serial ATA/100 ports (standard)

TRENTON Technology Inc.

2350 Centennial Drive
Gainesville, GA 30504
Tel: 800-875-6031 • Fax: 770-287-3150

TRENTON

www.TrentonTechnology.com

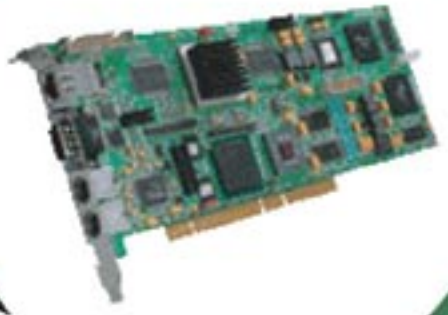
Trenton's MX8 single board computer is a PICMG 1.0 SBC that features the latest Intel® Pentium® 4 processor options and the Intel® 875P chipset. This combination brings an extraordinary level of processing speed, system value, and I/O functionality to embedded computing applications. The processor's new 90nm manufacturing process provides greater processing efficiencies, a larger data cache memory, and faster system bus support. The SBC's chipset supports a 400/533/800-MHz system bus, GigE, PCI-X, Serial ATA, and DDR266/333/400 memory. The chipset's AGP 4x video connection to a 16-MB ATI® video controller gives the MX8 the power for demanding video applications.

Intel® Communication Streaming Architecture (CSA) enables a high-speed 10/100/1000Base-T Ethernet interface that connects directly to the MX8's Memory Controller Hub (MCH). Connecting directly to the MCH via CSA approximately doubles the peak available bandwidth and provides a low-latency path to memory that increases network performance. The MX8's chipset supports Intel® Performance Acceleration Technology (Intel® PAT). Intel® PAT provides a faster data path between the processor cache memory and the DDR system memory when using an 800-MHz system bus and DDR400 memory.

The MX8 supports new PCI-X and PCI option cards, as well as legacy ISA option cards. Enabling PCI-X, PCI, and ISA option card communications makes the MX8 the ideal SBC for implementing new systems and for upgrading older systems. The features and capabilities designed into the MX8 single board computer provide the flexibility needed for a wide variety of embedded computing applications. Like all Trenton products, the MX8 is backed by more than 25 years of embedded computer design experience, quality manufacturing, and fast product deliveries.

For more information, contact jrenehan@TrentonTechnology.com. RSC #69 @ www.embedded-computing.com/catalogrsc

IMAGE IS EVERYTHING



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RSC #70 @ www.embedded-computing.com/rsc

Using AMC modules

to customize AdvancedTCA systems

By David Greig, SBS Technologies®, Inc.

Telecom systems based on existing PCI, CompactPCI, and VME architectures are quickly losing their capacity to satisfy the performance-hungry requirements of the latest telecom applications. As data traffic consumes more of a telecom's bandwidth – recently, about 80 percent of total telecom traffic – the requirements for higher performance equipment in the central office to direct and process telephone calls and data traffic are ever increasing.

To answer this need for speed, the PCI Industrial Computer Manufacturers Group (PICMG) created the Advanced Telecom Computing Architecture (AdvancedTCA). It is defined in the PICMG 3 specification as an open board, backplane, and software specification designed for the next generation of telecommunications and data center equipment. The principle objective of AdvancedTCA is to provide standardized platform architecture for carrier-grade telecommunication and data center applications, with support for carrier-grade features such as the Network Equipment Building System criteria, the European Telecommunications Standards Institute telecommunications standards, and 99.999 percent availability.

Off-the-shelf telecom equipment

For a better off-the-shelf alternative to today's proprietary telecom equipment, AdvancedTCA is a comprehensive specification that includes specifications for a larger form factor, shelf – or chassis – system management functions, hot-swap capability, and high-speed interconnections such as InfiniBand technology and PCI Express, among others.

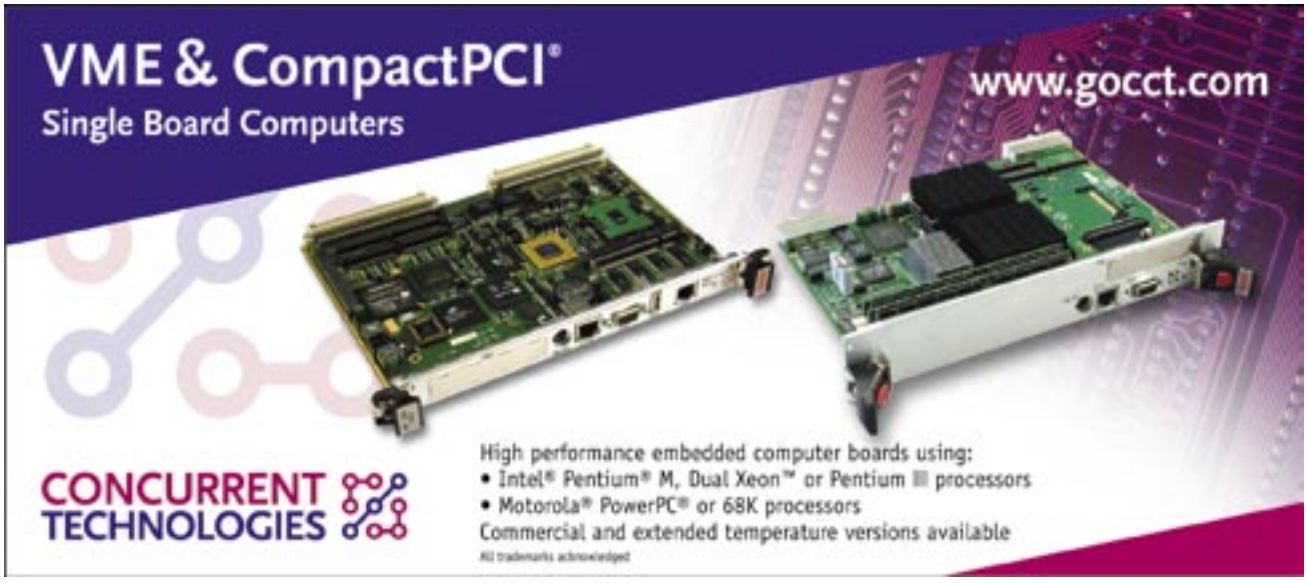
AdvancedTCA boards, or blades, are larger than the typical VME or CompactPCI boards in use today. For example, AdvancedTCA boards are 8U high or about 13" (332.25mm) and about 11" (280mm) deep, providing about 2.5 times more board area than a 6U VME or CompactPCI board. This larger board area offers support for the latest higher performance microprocessors, which require large heat sinks.

The AdvancedTCA Mezzanine Card (AMC) specification – the module specification for AdvancedTCA – allows telecom equipment vendors to enable higher system speeds, greater flexibility, and better reliability for the new AdvancedTCA-based telecom systems coming into the market.

AMC.0 is the base specification for AMC, defining parameters such as module outline, connector mechanicals, and available power. There are a number of subsidiary specifications that address specific applications, including:

- PCI Express interconnect (AMC.1)
- Ethernet links (AMC.2)
- Storage devices (AMC.3)

AMC.0 and AMC.1 will likely come up for ratification at the PICMG Executive Board meeting scheduled for September.



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AMC.2 ratification should follow sometime in January 2005.

Compatibility with existing mezzanine modules

The AdvancedTCA specification permits deployment of existing PMC modules, giving a significant advantage to companies such as SBS Technologies that already have a large selection of PMC modules for the telecom sector. For example, SBS supplies the IB4X-PMC-2 InfiniBand Host Channel Adapter and the Maxim 921-DS PMC for full-duplex channelized DS3 connectivity, among others, enabling telecom embedded developers to start customizing existing AdvancedTCA systems right away.

Although PMC modules extend existing telecom equipment and can work with today's AdvancedTCA systems, the increased capabilities of application-specific AMC modules give embedded developers the flexibility to upgrade and customize telecom systems with more options than ever before and with significant advantages over PMC modules such as larger board area, hot swap capability, system management interoperability, and increased power capacity.

AMC modules provide an expansion interface for AdvancedTCA blades that increases telecom system flexibility, scalability, and cost efficiency, and fulfills just about any telecom application including network processing, increased data throughput, line management, and mass storage devices. Because an AMC module is a hot-swappable mezzanine card, a technician can quickly exchange the card, enabling easy replacement of only the malfunctioning portion of an AdvancedTCA blade, instead of the whole blade, thus reducing system downtime and operating costs.

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David Greig, *President and Chief Operating Officer, SBS Technologies, Inc., held positions of vice president and president of SBS Commercial Group before his appointment to his current position. Before joining SBS, Dave was president of the Perle Customer Engineering Division of Perle Systems and later served as president of Perle's U.S. operations. Previously, he was the founder and president of Toronto-based Greig-Power Co., Ltd., a custom electronic system developer. Dave holds the equivalent of a bachelor's degree in electrical engineering from Ryerson Polytechnical Institute in Toronto, Ontario, Canada.*

SBS Technologies, Inc., *a leading provider of embedded computing technology, is ideally situated to offer embedded developers a full family of I/O and communication products and complete, integrated systems based on Intel® and Motorola® processors that will take full advantage of the capabilities the AMC specification adds to AdvancedTCA telecom systems. For more information, visit* www.sbs.com.

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NETWORK HARDWARE

AVT-418 Interface

FEATURES:

- All protocols supported; no additional hardware to buy or install
- Low cost and in-stock for quick delivery
- Full support for ISO 15765 CAN messaging; also known as Segmented or Multi-Frame messages
- Multiple units can be connected to a single host computer; can be remotely located
- Free software from our website to quickly get up and running; easy to connect and easy to use
- Prompt technical support

AVT inc.
Advanced Vehicle Technologies, Inc.

www.AVT-HQ.com

The model AVT-418 is an Ethernet interface to in-vehicle computer networks supporting: Controller Area Network (CAN); three CAN physical layers: CAN-C, CAN-B, and Single Wire CAN (SWC); LIN as Master or Slave; J1850 VPW (GM, Chrysler) with high speed and block transfer; J1850 PWM (Ford SCP); K-line communications: ISO9141 and KeyWord Protocol 2000; and Ford UBP. Other protocols are supported as well. The model AVT-418 communicates with the host computer via an Ethernet connection for fast, reliable communications. Product documentation, technical documentation, and a price list are all available from our website at www.AVT-HQ.com. Call or write for prompt support.

Advanced Vehicle Technologies, Inc.
1509 Manor View Road
Davidsonville, MD 21035
Tel: 410-798-4038 • Fax: 410-798-4308

For more information, contact support@AVT-HQ.com.

RSC #**7301** @ www.embedded-computing.com/catalogrsc

NETWORK HARDWARE

XDS MC-3 Boards

FEATURES:

- Utilizes the proven XDS Infinity series processor, and can be true H.100 or H.110 bus masters
- Features PCI Plug-and-Play, with 3.3V and 5V signaling supported on the PCI bus
- Can be equipped with enhanced conferencing capability, with up to 256 ports of conferencing available
- Uses dual counter-rotating fiber-optic rings, which can provide fallback capabilities for maintenance or failure
- Software drivers are available for the most common operating systems and can be downloaded from the XDS website
- Fully compatible with other XDS products and other H.110- and H.100-compliant products from other manufacturers

amtelco
XDS Technology

xds.amtelco.com

When system needs become too great to be handled within a single chassis, AMTELCO has the solution. The AMTELCO XDS MC-3 Multi-Chassis Interconnect Board provides fully dynamic switching between multiple chassis. The multi-chassis bus includes a total of 2,423 redundant full duplex connections. Configuring the bus in a non-redundant extended mode allows for system expansion of 4,800+ non-blocking time slots between either local or off-site locations. The board utilizes dual counter-rotating fiber-optic rings to connect between two to more than 20 chassis. Chassis can be up to 2,000 meters apart, and fallback capabilities can be implemented. The board is available in H.110 CompactPCI and H.100 PCI formats.

AMTELCO XDS
4800 Curtin Drive
McFarland, WI 53558
Tel: 800-356-9224 or 608-838-4194 • Fax: 608-838-8367

For more information, contact xds@amtelco.com.

RSC #**7302** @ www.embedded-computing.com/catalogrsc

NETWORK HARDWARE

CAN PCI Adapter

FEATURES:

- Self-powers via USB, CAN DB9 interface
- Baud rates up to 1 Mbaud
- SJA1000 controller chip, 82C251 transceiver chip
- Free Windows and Linux driver software
- Complete documentation and example programs
- Plastic housing with LED indicator

gridconnect.

www.gridconnect.com

Monitor your CAN network, write a CAN program on your PC, and communicate with your industrial, medical, automotive, or other CAN-based device. The USB CAN adapter connects a CAN bus to the USB port of a PC. It is recommended for use with notebooks that have no card slots. The USB CAN PCI Adapter supports CAN 2.0A (11-bit ID) and 2.0B (29-bit ID). A nine-pin SUB-D plug, defined by the CiA standard, connects the CAN network. The adapter accesses its power through the USB, and the LED shows proper operation.

Other features include: baud rates up to 1 Mbaud, Philips CAN-controller SJA1000.

Grid Connect Inc.
1841 Centre Point Circle, Suite 143
Naperville, IL 60653
Tel: 630-245-1445 • Fax: 630-245-1717

For more information, contact sales@gridconnect.com.

RSC #**7401** @ www.embedded-computing.com/catalogrsc

NETWORK HARDWARE

MAXIM 520 Line

FEATURES:

- V.35/X.21/EIA-530
- T1/E1/J1
- HSSI
- DS3/E3
- Front and rear I/O options available
- Comprehensive Driver Development Kit available
- Linux®, VxWorks®, Windows®, SolarisTM, and FreeBSD
- Frame relay, PPP, X.25, LAPB, LAPD, BiSYNC, X.21 bis, and Annex G

SBS Technologies.

www.sbs.com

The MAXIM 520 Line is a comprehensive offering of flexible, high-performance, and cost-effective WAN adapters. Ideal for enterprise/edge network elements such as routers, remote access servers, wireless base stations, voice-over-IP gateways, and VPN/firewall devices, the MAXIM 520 Line has interface options including synchronous serial T1/E1/J1, DS3/E3, and HSSI. The MAXIM 520 product line features a high-speed, quad-port communications controller that supports an aggregate throughput of 52 Mbps. It supports asynchronous, bisynchronous, SDLC/HDLC protocols.

SBS Technologies®
2400 Louisiana Blvd., NE
Albuquerque, NM 87110
Tel: 800-727-1553 • Fax: 505-875-0400

For more information, contact info@sbs.com.

RSC #**7402** @ www.embedded-computing.com/catalogrsc

NETWORK HARDWARE

TELUM 1000 Line

FEATURES:

- 155 Mbps full duplex line-speed
- PCI Express; PCI-e Rev. 1.0-compliant
- Support for 16,000 VCCs; 4 MB local memory
- Traffic management supported: ABR, CBR, UBR, and VBR
- Single or APS port versions
- Intelligent Platform Management Interface (IPMI)
- Comprehensive Driver Development Kit support available for Linux, VxWorks®, and Windows® 2000/XP
- Optional Automatic Protection Switching (APS) available

SBS Technologies

www.sbs.com

The TELUM 1000 Line is a high-performance, single-wide, full-height, AMC.1-compliant ATM adapter featuring a front-I/O, full-duplex, OC-3 interface. The TELUM 1000 Line uses the PCI Express bus to communicate with the host processor on an Advanced Telecom Computing Architecture (AdvancedTCA) system. The TELUM 1000 complies with ATM Forum UNI 3.1 and TM 4.0 and is based on an advanced ATM Segmentation and Reassembly (SAR) controller. The SAR segments and reassembles AAL0, AAL3/4, and AAL5 cells. It will manage and pass AAL1, AAL2, and raw cells. The TELUM 1000 supports one full-duplex OC-3/STM-1 interface for protocol data unit sizes as small as two cells.

SBS Technologies®
2400 Louisiana Blvd., NE
Albuquerque, NM 87110
Tel: 800-727-1553 • Fax: 505-875-0400

For more information, contact info@sbs.com.

RSC #**7501** @ www.embedded-computing.com/catalogrsc

NETWORK HARDWARE

Low Cost DIL/NetPC

FEATURES:

- 32-bit CPU with preinstalled embedded Linux
- 10/100Base-T and two serial interfaces
- CAN-, SPI-, I2C-bus for easy communication
- 8 MB Flash and 16 MB SDRAM
- Low-power design with 3.3V
- Easy-to-use Starter Kit

SSV

www.ssv-embedded.de

A new DIL/NetPC is able to bring 32-bit embedded Linux into low-cost embedded applications for 16-bit micro-controller units. To accomplish this goal, SSV is offering the new DIL/NetPC 32-bit DNP/5280 as a microcontroller platform for embedded Linux. This new expansion of the DIL/NetPC family results in a considerable price slide. For simplifying development, a Starter Kit is available at the price of EUR 249,00 (add shipping and handling). Included are a complete GNU-based cross development system and uCLinux (a special Linux version for CPUs without MMU) as the standard operating system, already preinstalled in the Flash memory.

SSV Embedded Systems
Heisterbergallee 72
Hanover, D-30453 DE
Tel: +49-511-40000-45 • Fax: +49-511-40000-40

For more information, contact kge@ist1.de.

RSC #**7502** @ www.embedded-computing.com/catalogrsc

eZ80Acclaim!™ Flash Microcontrollers

FEATURES:

- 10/100Base-T/MAC with MII interface to PHY devices (eZ80F91), integrated Tx/Rx FIFO DMAs
- 64 KB to 256 KB Flash memory, extra Flash info page (256 bytes to 512 bytes) for special parameter storage
- 4 KB to 16 KB high-speed SRAM for data storage or fast code execution
- 5V-tolerant, 24 to 32 GPIOs each supporting multiple interrupt modes or alternate functions
- 2 UARTs supporting 9-bit mode and independent 16-byte Tx/Rx FIFOs, SPI, I2C, and IrDA
- Watchdog timer, real-time clock, and four to six 16-bit programmable timers supporting captures/compares/PWM
- Power management modes supporting HALT/SLEEP/Peripheral power-down
- On-chip JTAG and ZDI debug interface
- On-chip PLL multiplying low-speed crystal input to maximum operating speed (eZ80F91)
- 20 MHz to 50 MHz maximum operating speed
- Supported by industry-leading, low-cost, high-feature development tools
- Field proven full-feature TCP/IP software suite available to accelarate embedded networking designs

ZiLOG

532 Race Street
San Jose, CA 95126
Tel: 408-558-8500 • Fax: 408-558-8300

ZiLOG
www.zilog.com

www.ZiLOG.com

The eZ80Acclaim!™ family of Flash Microcontrollers is the latest addition to ZiLOG's microcontroller line-up offering on-chip Flash memory and a 10/100Base-T Media Access Controller (eZ80F91). With speeds up to 50 MHz, designers have the necessary performance to execute complex real-time applications efficiently. Combining up to 256 KB of Flash with up to 16 KB SRAM, the eZ80Acclaim!™ Flash MCU provides the memory needed to implement communication protocol stacks for low-cost networking applications and achieves high flexibility when performing in-system or field updates.

The eZ80Acclaim!™ Flash MCU can operate in full 24-bit mode addressing 16 MB linearly without a Memory Management Unit (MMU). Additionally, support for the Z80®-compatible mode allows Z80/Z180 customers to execute legacy code within multiple 64 KB memory blocks with little modification. With an external bus supporting eZ80®, Z80®, Intel, and Motorola bus modes, designers have several options when interfacing to external devices.

These high-performance, 8-bit Flash microcontrollers offer a rich set of serial communication peripherals supporting legacy interfaces, and are equipped with an IrDA EnDec that facilitates wireless data transfer. The award-winning eZ80F91 represents the world's first 8-bit MCU with Flash and 10/100Base-T integration. The eZ80F92 and eZ80F93 devices offer pin-compatible footprints with the ROMless eZ80L92.

When combined with ZiLOG's full-feature TCP/IP software suite and industry-leading development tools, the eZ80Acclaim!™ MCU products will provide the best solution for low-cost embedded networking applications such as POS terminals, vending machines, facility automation and management, security systems, and IP appliances.

For more information, contact zservice@zilog.com.

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SERVERS AND BLADES

HMP Platform

FEATURES:

- Host Media Processing (HMP) platform allows customers to build flexible, scalable, cost-effective media servers
- Provides two dual Xeon® boards to perform all media processing without specialized DSP hardware
- Reduces customer and end-user costs while extending time in market for existing and future solutions
- Scalable from one to four Intel® Xeon® processors and packaged in a space-saving 2U rack-mount chassis
- ePCI-X passive backplane (CPU + 1/2 PCI-X slot)
- Single 300W PFC power supply for each side

Diversified Technology
An Ergon Co.

www.dtims.com/hmp

Diversified Technology, Inc. announces a powerful new application-ready computer platform for Voice-over-IP applications. The ePC-2S2L HMP platform enhances the performance and scalability of host-based media servers in a scalable, 2U, rack-mountable computer system. The system scales easily from one to four Intel Xeon processors and is designed to replace expensive DSP resource boards normally used for VoIP processing. The ePC-2S2L leverages Intel hyper-threading technology and can be used for a wide range of applications including conferencing, continuous speech processing, vocoding (G.711, G.723, G.729), call control (SIP and H.323), T38 fax, and IP voice-packet processing and routing.

Diversified Technology, Inc.
476 Highland Colony Parkway
Ridgeland, MS 39157
Tel: 800-443-2667 • Fax: 601-898-4185

For more information, contact sales@dtims.com.

RSC #**7701** @ www.embedded-computing.com/catalogrsc

SWITCHES

Model 5468 Switch

FEATURES:

- Fourth-generation BCM5388 Layer-2 switch; Intel 82546 dual-port PCI-X MAC host interface
- 133/100/66-MHZ, 32/64-bit PCI-X bus interface; PMC-Sierra PM8363 quad gigabit serdes transceiver
- Onboard FPGA for management, control, and routing functions; high-performance wire speed on all ports, 16 Gb total
- Up to 16M frames per second maximum switching rate; onboard firmware for configuration, management, and monitoring
- 1.5 Mb of onboard memory for packet buffering; Extended Ethernet frame sizes to 9 KB; fully IEEE 802.3-compliant
- PCI Rev. 2.2 and PCI-X 1.0-compliant; VxWorks 5.5 and Linux 2.4.xx driver support; FCC certified (pending)

dss networks
The Gigabit Experts

www.dssnetworks.com

The 5468 Switch is a compact, eight-port GigE switch on a highly integrated PMC mezzanine card form factor, featuring an innovative "4 + 2 + 2" switching design that is both unique and highly functional. It is designed to provide add-on GigE switching capabilities in a compact space. It has an integrated eight-port, Layer-2 device as the central switching function, a two-port PCI-X MAC host interface, an onboard control FPGA, and transceivers for the inter-connect. The eight ports are routed as follows: four ports to RJ-45's on the PMC bezel, two ports to the host via the Gigabit MAC's PCI/PCI-X bus interface, and the remaining two ports routed as 1-Gb serdes to the I/O pins on the PMC JN4 connector.

DSS Networks, Inc.
111 Pacifica, Suite 250
Irvine, CA 92618
Tel: 949-727-2490 • Fax: 949-727-2498

For more information, contact info@dssnetworks.com.

RSC #**7702** @ www.embedded-computing.com/catalogrsc

SWITCHES

Model 8261 Switch

FEATURES:

- Fourth-generation BCM5690 switch fabric and BCM5464SRKB quad-port transceivers from Broadcom
- High-performance wire speed on all ports – 24 Gb total; up to 32,000,000 frames per second maximum switching rate
- Onboard firmware for configuration, management, and health monitoring
- Cell and packet-based "head-of-line" blocking prevention; 1 MB of onboard memory for packet buffering
- Extended Ethernet frame sizes to 9 KB; fully compliant to IEEE 802.3 specifications, including auto negotiation
- Onboard Motorola DSP56F826, 80-MHz RISC/DSP processor for local management; serial port for console CLI and debug

dss networks
The Gigabit Experts™

www.dssnetworks.com

This is an advanced high-performance, full-featured multilayer, 6U GigE switch-fabric board featuring 12 10/100/1000Base-T ports over copper with two 1000Base-SX/LX fiber uplinks. This switch is PICMG 2.16-compliant and compatible with both standard CompactPCI and PICMG 2.16 backplanes. All 12 ports can be routed to slots on the CompactPCI backplane or externally via rear I/O. The model 8261 uses the latest advanced high-performance, full-featured and highly integrated 12-port Broadcom BCM5690 multilayer switch and BCM5464SR quad-port transceivers, and is fully 802.3-compliant. This switch is available with an OEM developer's kit containing onboard firmware with many features.

DSS Networks, Inc.
111 Pacifica, Suite 250
Irvine, CA 92618
Tel: 949-727-2490 • Fax: 949-727-2498

For more information, contact info@dssnetworks.com. RSC #**7801** @ www.embedded-computing.com/catalogrsc

SWITCHES

CP920

FEATURES:

- 6U single slot, CompactPCI carrier-grade switch designed for NEBS compliance
- Full managed solution with Layer 2/3/4 switching at full wire speed
- Telnet – accessible via any switch port and console serial interface
- QoS on Layers 2/3/4 and 802.1p tag
- Advanced packet filtering, link aggregation, 802.3ad, 802.1Q VLAN, spanning tree, broadcast control, and port mirroring
- Complies to PICMG 2.16 fabric slot and PICMG 2.9 IPMI

GE FANUC
Embedded Systems

www.gefanuc.com/embedded

The CP920 is a full-wire-speed, managed Layer 2/3/4 CompactPCI switch providing an all-gigabit solution for high-availability PICMG 2.16 systems with 24 ports of GigE routed to the rear I/O. In addition, the CP920 offers Layer 3 support for routing and Layer 4-7 packet classification and filtering. All the ports are switched ports.

The switch offers full management capability via Telnet or a console serial interface and complies to the system-level bus specification PICMG 2.9. The CP920 is a field replaceable unit and responds to system requests.

GE Fanuc – Embedded Systems
12090 South Memorial Parkway
Huntsville, AL 35803-3308
Tel: 256-880-0444 • Fax: 256-882-0859

For more information, contact info.embeddedsystems@gefanuc.com. RSC #**7802** @ www.embedded-computing.com/catalogrsc

AT922 ATCA Hub

FEATURES:

- 48 1000Base-T ports in the AdvancedTCA 8U form factor; IPMI-compliant according to PICMG 3.0 specification
- Dual PMC slots are compliant to PICMG 2.15 (dual GigE connected to the fabric)
- Four 10/100/1000Base-T copper and four 1000Base-T fiber ports to the front panel
- Four 10/100/1000Base-T copper ports to the rear I/O
- VLAN support, rapid spanning tree, link aggregation/failover, IP multicast, QoS, 802.3ad, and advanced packet filtering
- PICMG 3.0- and PICMG 3.1-compliant

GE FANUC Embedded Systems

www.gefanuc.com/embedded

The AT922 is a 48-port AdvancedTCA hub board supporting GigE switching. It is suitable for use in a dual star AdvancedTCA chassis, as defined by the PICMG 3.0 and PICMG 3.1 specifications, for both the base and fabric ports. The AT922 has 12 I/O gigabit ports: eight ports interfacing to the front panel, and four to the rear transition card. The Ethernet ports connect to the redundant system shelf managers.

The AT922 is a single-fabric solution with all 48 ports in the same switch fabric. This configuration enables the I/O ports and PMC/AMC I/O daughtercards to provide resources to either the base or fabric ports.

GE Fanuc – Embedded Systems
12090 South Memorial Parkway
Huntsville, AL 35803-3308
Tel: 256-880-0444 • Fax: 256-882-0859

For more information, contact info.embeddedsystems@gefanuc.com. RSC #7901 @ www.embedded-computing.com/catalogrsc

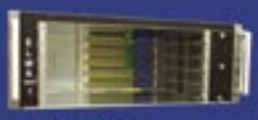
WE'VE MET THE STANDARDS, NOW LET US RAISE YOURS

AdvancedTCA®

- Available in 4U, 5U, 12U & 13U
- Uses AdvancedTCA Replicated Mesh or Dual Star Backplane
- Compliant to PICMG 3.X Specifications
- Countless Configurations Available
- Sentry™ Shelf Manager

ELMA Your Solution Partner

US Elma Electronic Inc. Phone: 510.656.3400 - Email: sales@elma.com - Web: www.elma.com



Systems

Backplanes

Accessories

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CONVERGING COMPUTING AND COMMUNICATIONS

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+ Flex21™ cPCI and FlexATCA™ hardware
+ upSuite® high availability middleware
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RSC #80 @ www.embedded-computing.com/rsc

The new PICMG 1.3 specification –

Bringing PCI Express to an SBC near you

By Michael Bowling, Trenton Technology Inc.

All too often committees create new embedded computing specifications with only a vague idea about what problem the specification is trying to solve. With PICMG 1.0 and 1.2 SBCs or System Host Boards (SHBs) and backplanes, many system designers are running into the inherent bandwidth limitations of parallel bus technology, especially when designing systems using the latest high-performance processors and chipsets. The PICMG 1.3 specification solves the bandwidth problem by replacing the SHB to backplane parallel bus interfaces with high-speed serial links. The specification corrects data bottlenecks, maintains backward compatibility with PCI and PCI-X option cards, provides additional power to the PICMG 1.3 edge connector, and offers advanced features such as IPMI, Serial ATA, USB, and Ethernet connections from the PICMG 1.3 SHB's edge connectors to the PICMG 1.3 backplane. The ubiquitous PICMG 1.0 system has long been a mainstay in the embedded computing industry due to its ability to support a large number of different option cards and system peripherals, while providing long MTBFs, fast MTTRs, long-life embedded component support, and flexible system designs. PICMG 1.3 continues that legacy while providing a faster system platform that maintains support for today's PCI/PCI-X option cards as well as PCI Express cards. The PICMG 1.3 specification replaces the PICMG 1.0 ISA/PCI bus combination with PCI Express and/or PCI/PCI-X interfaces to the backplane.

PICMG 1.3 overview

The PICMG 1.3 system host board interfaces to PCI Express peripherals on a backplane. Multiple PCI Express links to the backplane can operate at x1, x4, x8, or x16 depending on the capabilities of both the SHB and the backplane. Edge connectors A and B are the SHB's PCI Express links to the backplane. See Figure 1.

Today's PCI and PCI-X option cards can take advantage of the high-speed serial links, streamlined interconnects, and robust protocol that PCI Express offers in the PICMG 1.3 specification via PCI Express-to-PCI/PCI-X bridge chips on the backplane. The specification also accommodates an optional 32-bit PCI/PCI-X connection for supporting passive (such as no bridge) backplanes. The PCI/PCI-X clock rate between the SHB's optional connector D and the backplane can be 33 MHz, 66 MHz, 100 MHz, or 133 MHz, depending on the backplane's and the SHB's design.

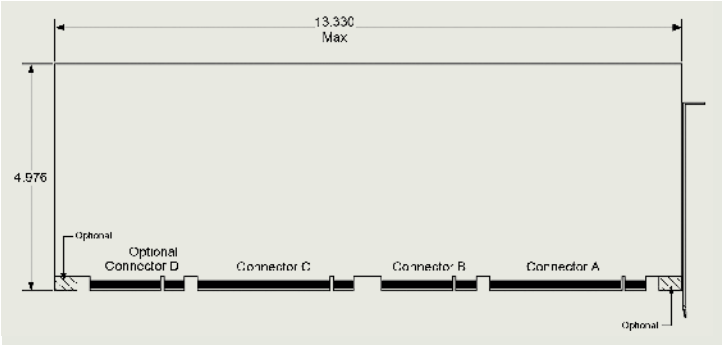


Figure 1

SHB connector C contains extra edge connector contacts for additional power. The specification also features optional SHB to backplane interfaces for:

- SATA
- USB
- IPMB
- SMBUS
- Geographic addressing
- Power management

These features are available to the system designer to implement as needed. Figure 1 illustrates the full-size PICMG 1.3 SHB with all of the edge connectors defined. Figure 2 shows the half-size version.

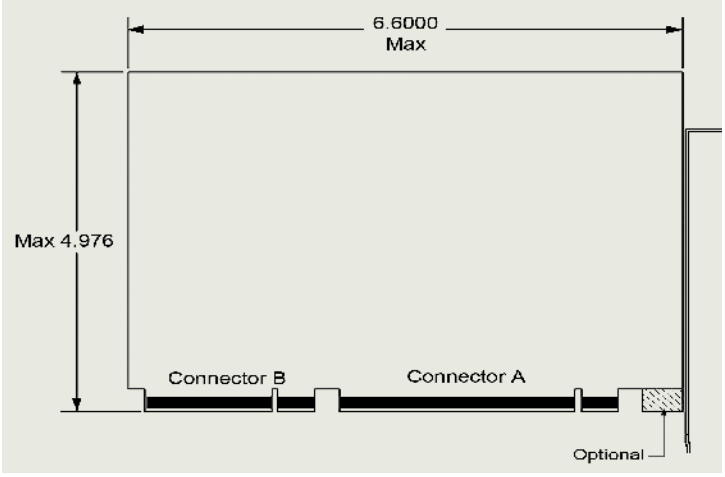
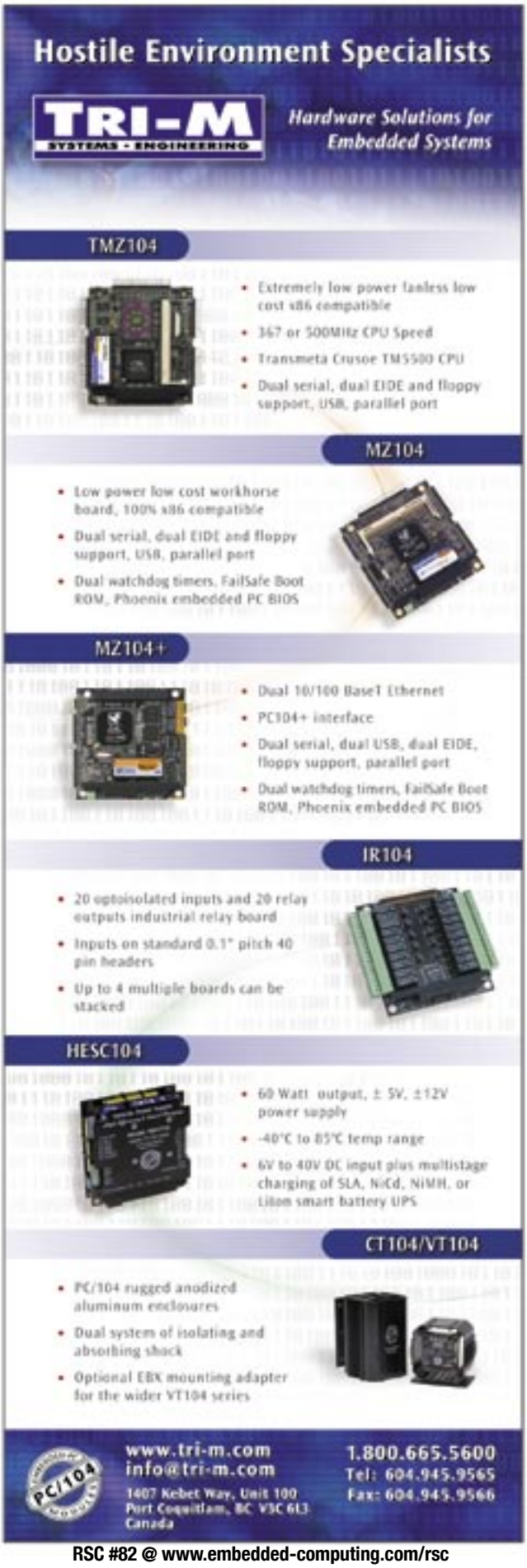


Figure 2



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The new PICMG 1.3 specification –

Bringing PCI Express to an SBC near you

The PCI Express SHB to backplane configuration options offered by the PICMG 1.3 specification are designed to meet the needs of a wide variety of embedded computing applications. The flexibility built into the specification provides support for today's PCI and PCI-X option cards and the latest PCI Express card offerings. Provisions designed into the specification also provide future Advanced Switching option card support.

"The specification's flexibility allows system designers to protect their organization's investment in PCI and PCI-X technology while taking advantage of the speed and increased bandwidth of PCI Express."

PICMG 1.3 ratification timetable and summary

As I write this article, the key components of the PICMG 1.3 SHB and backplane specification are defined and complete. The final agreement on the specification's components among the twenty companies that make up the PICMG 1.3 Technical Subcommittee is in process. The subcommittee is planning final approval of the specification for the fall of 2004. PICMG 1.3 SHBs and backplanes will be available from multiple embedded computing vendors in the late 2004 and early 2005 time frame.

These new, innovative embedded computing products will bring an improved level of PCI Express functionality and performance to industrial computing platforms. The PICMG 1.3 Technical Subcommittee has developed the PICMG 1.3 specification with maximum flexibility in mind. The specification's flexibility allows system designers to protect their organization's investment in PCI and PCI-X technology while taking advantage of the speed and increased bandwidth of PCI Express.

Michael Bowling *is a design engineer and has been actively involved in designing board-level embedded computing products for a number of years. Trenton Technology is the draft editor for the PICMG 1.3 specification, and Michael is the lead writer for the specification. Michael holds a BS degree in computer engineering from the Georgia Institute of Technology and an MBA degree from Brenau University.*

Trenton Technology Inc. *is an Executive and founding member of the PCI Industrial Computer Manufacturers Group (PICMG) and one of the original developers of the PICMG 1.0 specification. Trenton designs and manufactures single board computers, system host boards, and backplanes for critical applied industrial and embedded applications such as telephony, imaging, instrumentation, control, and other environments that require performance, precision, and reliability. Visit* www.TrentonTechnology.com *for more details.*

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- 105 MSps sampling on two synchronous channels
- Up to 1 GS of onboard acquisition memory
- 180 kHz to 230 MHz of bandwidth
- Time stamping, external trigger and clock
- 200 MBps data transfer via 32-bit, 66-MHz PCI

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The CS14105 14-bit digitizer for the PCI bus is specifically designed for critical communications and RF signal capture and analysis. The CS14105 features two synchronous channels, sampling rate of 105 MSps, and 180 kHz to 230 MHz of bandwidth. The CS14105 provides trigger and clock output signals for ease of synchronization with other system modules. The single input range of 0.5V RMS is coupled to a transformer with 50 ohms of impedance, satisfying a key wireless communications test requirement. GageScope® oscilloscope software provides programming-free operation by enabling the user to easily set up the digitizer, acquire, view, archive, and analyze signals. Software Development Kits (SDKs) for C/C++, MATLAB, and LabVIEW are also available.

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Lachine, QC H8S 4H2 Canada
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DATA ACQUISITION

14-bit PCI Digitizer

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- 200 MSps, 100 MHz bandwidth on two synch channels
- Up to 1 GS of onboard acquisition memory
- Time stamping, digital inputs, and gated capture
- Full-featured, software-controlled front end
- 200 MBps data transfer via 32-bit, 66-MHz PCI

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The CS14200 14-bit digitizer for the PCI bus provides precision signal capture for various fields of scientific and commercial research, development, and manufacturing test applications. The CS14200 features two synchronous channels, a fast sampling rate of 200 MSps, and 100 MHz of bandwidth. Additional features include up to 1 GS of onboard acquisition memory, time stamping, digital inputs, and gated captures. The world-renowned GageScope® oscilloscope software provides programming-free operation, enabling the user to easily set up the digitizer, acquire, view, archive, and analyze signals. Software Development Kits (SDKs) for C/C++, MATLAB, and LabVIEW are also available for custom programming.

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DATA ACQUISITION

3U Frequency Counter

FEATURES:

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- Frequency range from 0.06 Hz to 100 kHz
- Differential and TTL inputs provided
- Differential input range ±20mV to ±20V
- Programmable AC/DC differential inputs
- Programmable hysteresis level

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The P635 is a single-width, 3U, PXIbus module with eight frequency measurement channels. This counter module can be used to monitor a variety of pulse sources in a frequency range of 0.06 Hz to 100 kHz. Its unique circuitry enables monitoring of a wide range of frequencies without changing any module settings. TTL inputs are provided as well as differential input circuits with filtering and hysteresis to provide high noise immunity. AC or DC coupling of the differential inputs is programmable on a per-channel basis. A precision time base and a programmable observation window (from 1 ms to 1.024 seconds) contribute to making this a versatile and powerful addition to PXI test systems.

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VXI Controllers

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The V152 VXI controller features a PowerPC processor with 350 and 450-MHz clock options, Ethernet, RS-232, real-time clock, timers, counters, up to 512 MB of DRAM, and supports VxWorks. The V153 VXI controller features a Pentium III processor with 733-MHz and 1.26-GHz clock options, dual Ethernet controllers, onboard hard and floppy drives, RS-232, real-time clock, counters, timers, up to 512 MB of SDRAM, and supports Win 2000 or LINUX. The V15X VME to VXI adapter provides direct access to the VME module's I/O connections and can act as bus master or slave in a VXI mainframe. Coming soon: A V154 VXI controller with a PowerPC processor, 500-MHz and 1-GHz clock options, and up to 1 GB of SDRAM.

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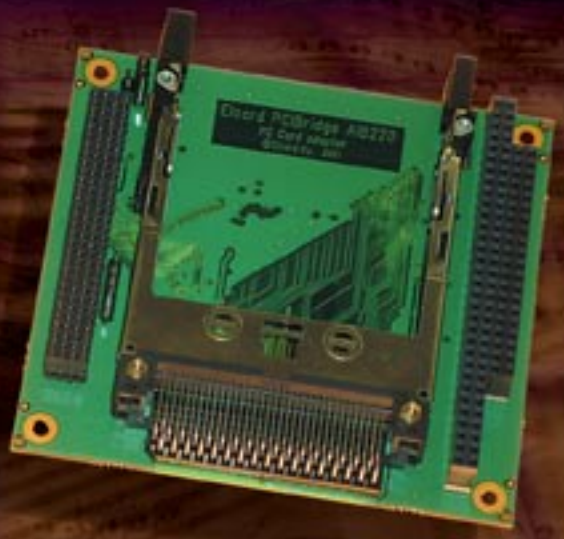

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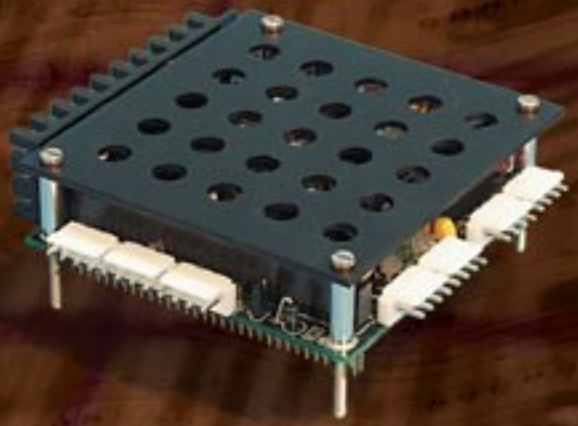

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Diversified DSPs fit every market space

By Ray Simar, Digital Signal Processing Semiconductor Group, TI

Only a decade ago, most designers considered DSPs esoteric, tightly focused products that were more useful in the lab than in the real world. DSPs were relatively expensive then and did not have a wide base of development support. Consequently, application areas were tightly defined, and many designers avoided the devices, which they perceived as difficult to work with.

What a change a few years can make. Today DSPs have become mainstream products, with developers widely using them in a variety of application areas, from telecom infrastructure to wireless handsets, from automobile engines to consumer audio entertainment, from digital cameras to Magnetic Resonance Imaging (MRI), and from motor control to video compression. What's more, the list keeps growing, as system designers continue to find innovative uses for DSPs, widening the range of applications far beyond anything imagined just a few years ago. Developer requirements have pushed and continue to push DSPs to new levels of performance that in turn create the opportunity for further widening the application range.

More tools – more DSPs

The remarkable success of DSPs comes from significant increases in integration and performance, along with steady reductions in price and power consumption. In addition, DSP development support today rivals that of long-established, general-purpose microprocessors. DSP system designers can now count on having available Integrated Development Environments (IDEs), highly efficient compilers for high-level languages, Real Time Operating Systems (RTOSs), software reference frameworks, a wide variety of off-the-shelf algorithms, and networks of third-party developers offering tools and services that supplement those of DSP vendors. All of these factors working together have created a critical mass for digital signal processing, so that DSP-based products are appearing everywhere, with no end in sight to the innovation.

As the market for real-time signal processing grows, programmable DSPs diversify more to meet the requirements of different application segments. When designers choose a DSP, they are weighing the relative importance in their systems, such as performance, price, and power consumption – the "three Ps." The balance among these factors determines the right type of DSP for the application.

Some application areas, such as telecom infrastructure and video imaging, require raw processing performance as the primary requirement. Low power per executed operation is the next consideration, since it keeps heat dissipation low and permits a designer to implement more channels in the same space. On the other hand, handheld devices such as cell phones require very low power consumption to prolong life between battery charges. Price is also an important consideration for these high-volume products. Finally, plug-in consumer audio and computer products are very sensitive to price and require good performance, but are less important regarding power consumption.

Distinct architectures for today's requirements

DSP vendors address these different sets of requirements with product lines based on distinct architectures. For instance, Texas Instruments based its TMS320C6000 generation of DSPs on a Very Long Instruction Word (VLIW) architecture that permits massive parallelism in applications such as wireless base stations, DSL line cards, video servers, and other infrastructure equipment. The TMS320C64x™ DSP platform, TI's top of the line in performance, is now available in gigahertz versions executing more than 8000 MIPS. TI's TMS320C67x™ DSPs provide the extra accuracy of the floating-point format for high-quality audio, imaging, and other precision applications.

"... DSPs diversify more to meet the requirements of different application segments. When designers choose a DSP, they are weighing the relative importance in their systems, such as performance, price, and power consumption – the "three Ps." The balance among these factors determines the right type of DSP for the application."

The TMS320C55x DSP platform delivers extremely low power performance for applications ranging from portable Internet appliances to high-speed wireless communications. To increase battery life, C55x DSPs automatically power down inactive peripherals, memory, and core functional units. TI's highly

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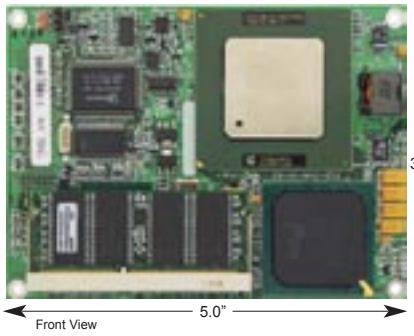

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High Density Connector

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800Mhz ~ 1.26Ghz CPU
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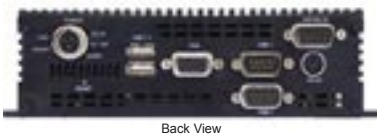

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Diversified DSPs fit every market space

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TMS320C28x DSPs integrate essential peripherals with the performance needed to provide real-time control for motors, robotics, uninterrupted power supplies, and other smart systems.

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Ray Simar *is currently responsible for enhancing TI's DSP solutions leadership position by developing advanced architectures for diverse applications. In 1997, Ray became a TI Fellow in recognition of his pioneering work on DSP technology. Ray received his bachelor of science degree at Texas A&M University and master of science degree in electrical engineering from Rice University. He holds more than 10 patents in DSP technology.*

Texas Instruments Incorporated *is a worldwide leader in digital signal processing and analog technologies – the semiconductor engines of the Internet age. For more information, visit* www.ti.com.

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The SBC6x is a high-performance, DSP-based controller featuring dual OMNIBUS I/O module sites, 32 bits of digital I/O, high-speed FIFO Port, as well as RS-232 and USB interfaces. This 160mm x 100mm card operates independently from a host PC enabling it to be freely embedded into custom target systems to perform autonomous data acquisition or control functions. The SBC6x is perfect for a wide variety of applications requiring fast, multichannel data I/O coupled with onboard processing.

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SBC6713e

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SBC6713e is a high-performance, flexible, standalone DSP board with Ethernet connectivity, loaded with I/O peripherals. Built around the powerful, C-friendly, 300-MHz floating point C6713 DSP, it is a fully open platform with 15+ OMNIBUS available off-the-shelf daughtercards that provide a wide choice of A/D and D/A and also support simple EMIF bus interfacing to custom I/O daughtercards. TCP/IP is runs on a dedicated DM640 coprocessor to preserve the C6713 for user code and other peripheral controls. System-level integration is facilitated with onboard digital I/O, DDS time base, external clock input, multi-card sync, FIFO Port data links, 2 MB Flash ROM, and watchdog. Get online quotations!

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- Independently set/adjust parameters for each channel; simultaneous, real-time encoding of four video and audio streams
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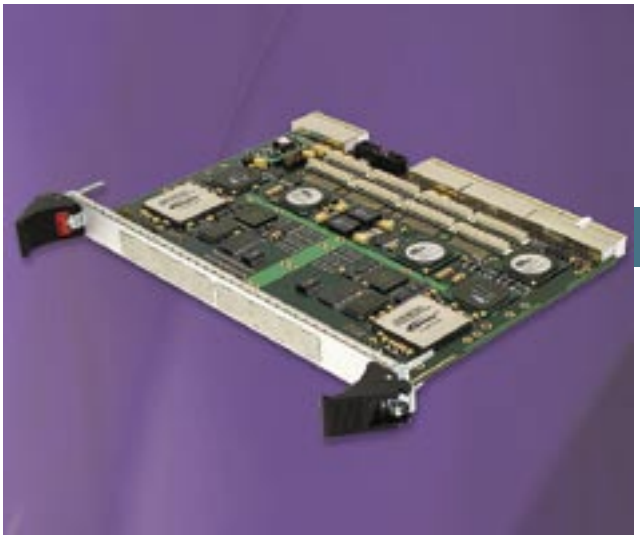

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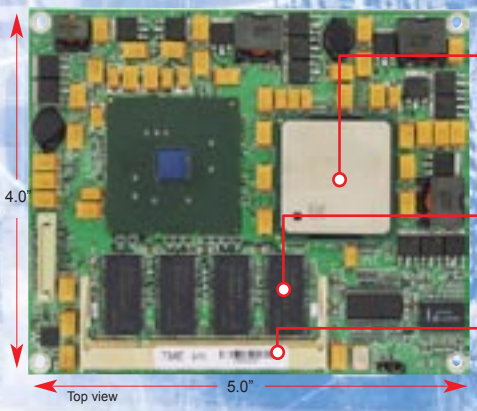

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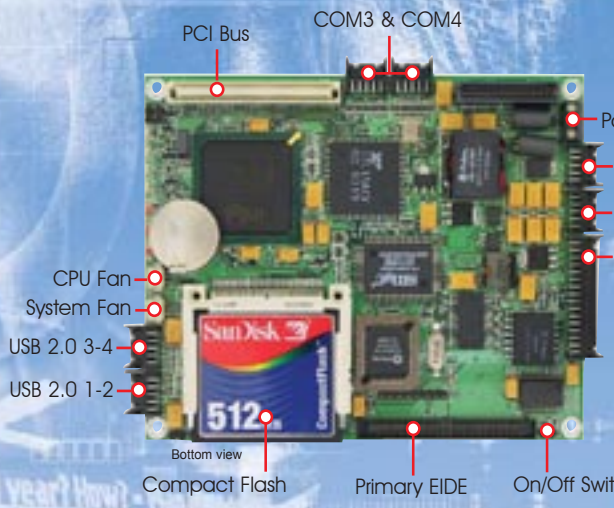

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Homeland security and embedded software

By Dr. Inder M. Singh, LynuxWorks

With homeland security a national priority in post 9/11 America, the growing use of embedded devices in sensitive systems represents a major area of vulnerability. The proliferation of Internet connected embedded devices has created opportunities for malicious users to exploit security weaknesses in embedded software to gain access to sensitive systems. For example, intruders can access classified information, bring down a critical system, or gain control and modify its behavior in dangerous ways. Even embedded devices not directly on the Internet can be accessible through dial-up ports or through local private networks, all of which can be accessible through PCs with networks possibly connected to the Internet. As a result, developing highly secure embedded systems is imperative to ensure the safety of our country's critical infrastructures.

Many embedded devices are located in areas critical for homeland security, from the power grid and the communications infrastructure to power utilities, railroads, and chemical and nuclear plants. These embedded devices include Supervisory Control and Data Acquisition Systems (SCADA), Programmable Logic Controllers (PLCs), digital controllers, communications switches, and intelligent devices of many kinds.

Bullet-proof OS

Clearly, there is an urgent need to ensure that the embedded software in such devices is highly secure. For this, it is essential that the embedded operating system (OS), which provides the foundation for all embedded application software, be bullet proof. Otherwise, any added security mechanisms implemented in the embedded software, such as encryption or biometric authentication, could be bypassed or compromised.

The traditional approach to commercial operating system security has been "Penetrate and Patch." Hackers discover OS vulnerabilities and exploit them with attacks such as viruses, worms, and Trojan horses. OS vendors then scramble to develop and release patches to fix the vulnerabilities, which must then be applied expeditiously to all deployed systems. "Penetrate and Patch" is even more challenging for embedded devices, many of which have the software embedded in Read Only Memory (ROM) and are intended to be treated by users as dumb boxes rather than intelligent computers. A solution is to provide "Protection in Depth," where systems are designed to be highly secure and a methodology is in place for providing measurable assurance against vulnerabilities.

An internationally accepted standard approach to specifying and evaluating security assurance is provided by Common Criteria (see www.commoncriteriaportal.org). The evaluation of security software through the Common Criteria standard defines Evaluation Assurance Levels (EAL 1-7) that indicate the process rigor associated with the development of an information technology product, as shown below:

- EAL-1: Functionally tested
- EAL-2: Structurally tested
- EAL-3: Methodically tested and checked
- EAL-4: Methodically designed, tested, and reviewed
- EAL-5: Semi formally designed and tested
- EAL-6: Semi formally verified, designed, and tested
- EAL-7: Formally verified, designed, and tested

The level of assurance rigor increases from EAL-1 (lowest) to EAL-7 (highest). Assurance to EAL-7 involves formal verification of the software product using mathematical models and theorem proving.

Operating systems have been getting progressively larger, and security related mechanisms are intermixed with many other kinds of functionality, all of which run in privileged mode and, if flawed, can be a cause of serious vulnerabilities. The higher levels of assurance (EAL-5 through EAL-7) require mathematical or formal/semi-formal verification. This is not possible with today's formal methods technology, especially for large systems that can consist of millions of lines of source code. To formally verify such a system, it would take millions of man-hours and an enormous budget. As a result, there is no operating system today that has been certified to EAL-7, which is needed for critical systems.

"Operating systems have been getting progressively larger, and security related mechanisms are intermixed with many other kinds of functionality, all of which run in privileged mode and, if flawed, can be a cause of serious vulnerabilities."

Brick-wall partitioning

A way around this dilemma is provided by the Multiple Independent Levels of Security/Safety MILS architecture (see Figure 1). The MILS architecture is based on the concept of a small partitioning kernel, sometimes referred to as a separation kernel, which is the only software that runs in supervisor mode and that provides brick-wall partitioning of memory, time, and I/O resources. The partitioning kernel provides only the basic functionality needed to support the underlying hardware and provides the partitions that essentially implement isolated virtual machines. Each partition is guaranteed a fixed share of required resources including memory, CPU time, and internal kernel buffers, eliminating denial-of-service vulnerabilities between partitions. Within each partition, the traditional OS functionality is implemented in user mode completely isolated from other partitions. The middleware and applications make up the rest of the components that may execute in a single partition.

The partitioning kernel in the MILS architecture is the policy enforcing entity that has foundational security functions that are non-bypassable, always invoked, evaluatable (through mathematical verification), and tamper-proof. The partitioning kernel itself must be small enough to be certifiable to EAL-7. The separation provided by the partitioning kernel enables any additional security functions to be implemented in one or more dedicated partitions and to be certifiable to EAL-7 as well. At the same time, user mode versions of Linux or current POSIX-compliant RTOSs, such as LynxOS from LynuxWorks, can run in other partitions to support the rest of the embedded applications software. This approach enables reuse of existing software and reduces the time and cost it would take to provide the highest levels of security assurance.

Dr. Inder M. Singh *is the CEO and chairman of LynuxWorks. He also serves as board chairman and president for the Embedded Linux Consortium. Dr. Singh holds Ph.D. and M.Phil. degrees in computer science from Yale University and an MSEE from Polytechnic Institute of New York.*

LynuxWorks, Inc. *is a pioneer and a proven leader in the embedded systems industry with more than 16 years of experience. LynuxWorks' embedded operating systems are based on open standards and are used in products made for markets such as communications, aerospace and defense, medical, and automotive. For more information, visit* www.lynuxworks.com.

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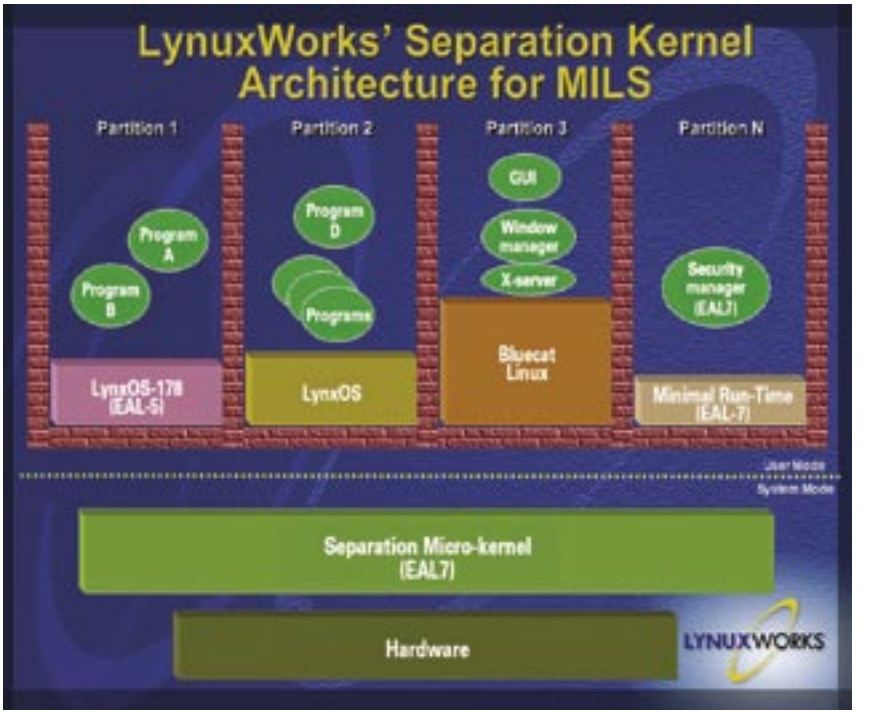

Figure 1

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The SystemTrace 1553 Bus Monitor/Analyzer is capable of monitoring and recording activity on up to eight dual-redundant MIL-STD-1553 buses (four per probe card). This feature enables the analysis of data transfers between all devices that participate in data transfers on the network. Data is monitored by symbolically specifying occurences on the bus as "Events" for the module to monitor and record. Conditions for Event recording can be set up by the user, such as number of Event occurences, elapsed time, or a dependence on the occurence of other Events.

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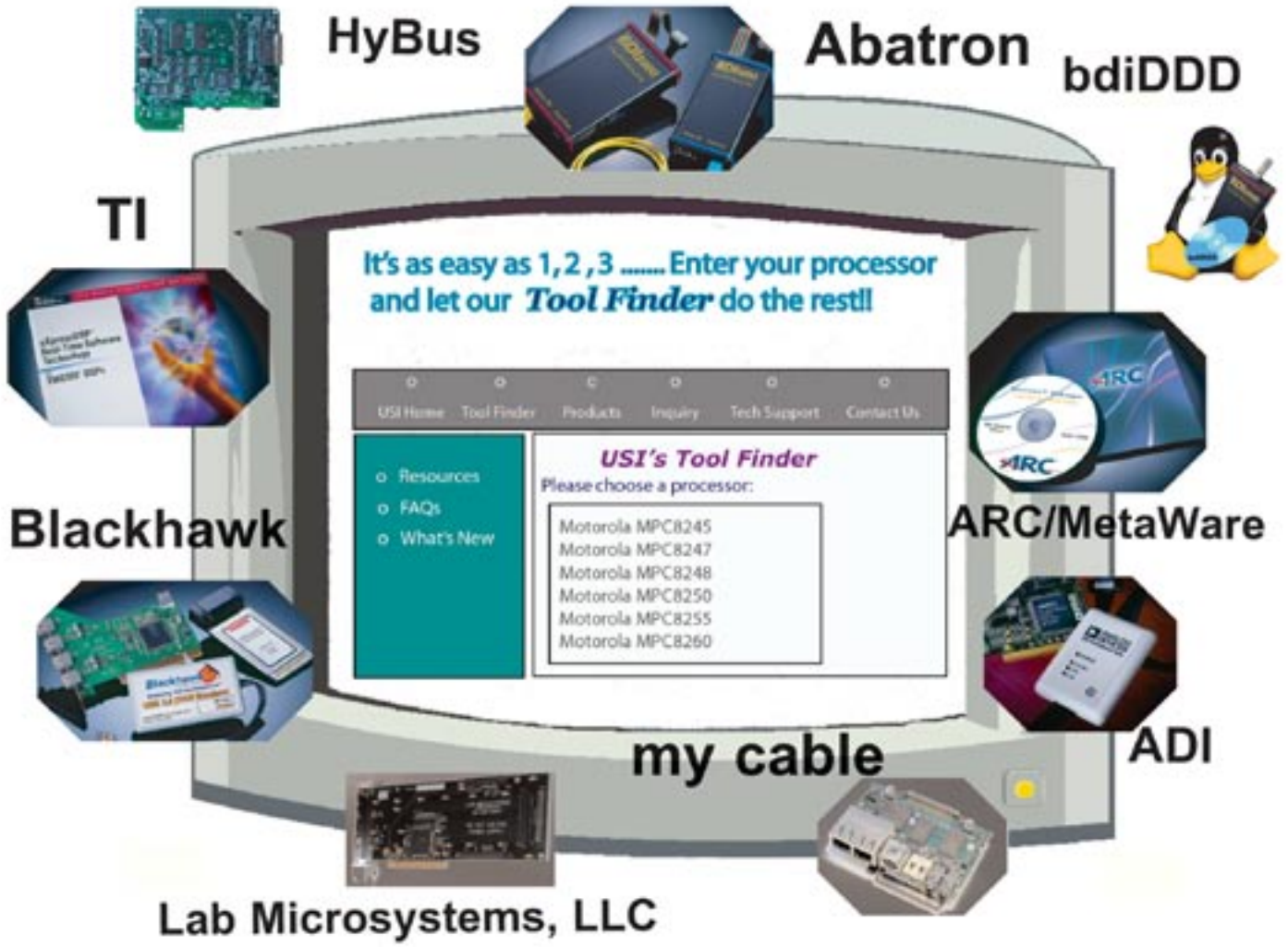

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How AMCC's PowerPC440SP

is addressing today's storage solutions

Sam Fuller

John Fakiris

By Sam Fuller and John Fakiris, Embedded Products, AMCC

As the requirements for storage capacity, reliability, and performance continue to increase, the use of Redundant Array of Independent Disks (RAID) technology becomes more pervasive in the industry. RAID describes a technology where a set of multiple independent hard drives logically joins together. The RAID storage segment spans a wide range of performance, from entry-level storage systems to high-performance and high-volume enterprise storage systems to meet today's growing requirements.

As the number of disk drives and/or the performance requirements of the storage system increase, designers can achieve a more efficient implementation by using separate I/O, or intelligent I/O, processor-based RAID controllers (IOP). In this configuration, the host processor off-loads the RAID control functions to the IOP, thus reserving the host processor cycles for other user applications.

An important benefit of IOP-based implementation is the separation of the RAID control function from the disk drive protocol and drive controller. This setup enables the OEM to use commodity-type protocol processor chips or cards, such as SATA, SCSI, and SAS, and to interface them with the IOP device via standard PCI-X interfaces. (Figure 1 shows the IOP on an adapter card, and Figure 2 shows the IOP in an external RAID storage setup.) The server OEM can also mix and match various protocol functions on the server rack, as required by customers, without changing the RAID controller. When designing with IOP-based RAID controllers for high-performance storage systems, the system designer must consider the bandwidth performance and limitations of the IOP RAID controller to avoid bottlenecks that reduce performance. An integral part of the overall RAID subsystem and its performance is the

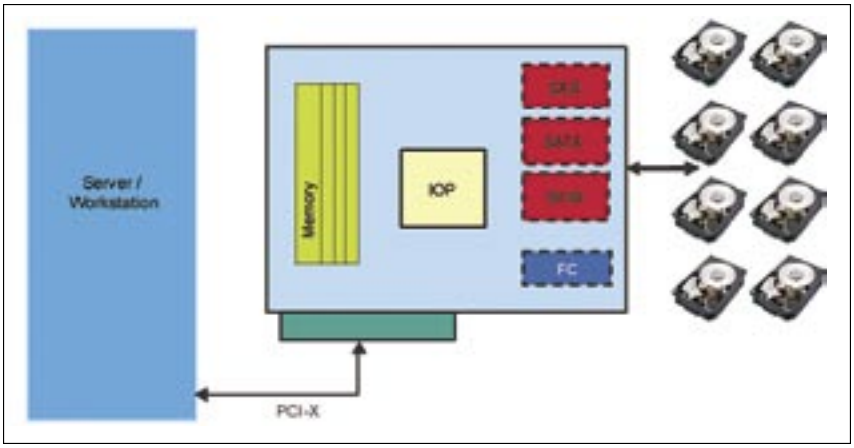

Figure 1

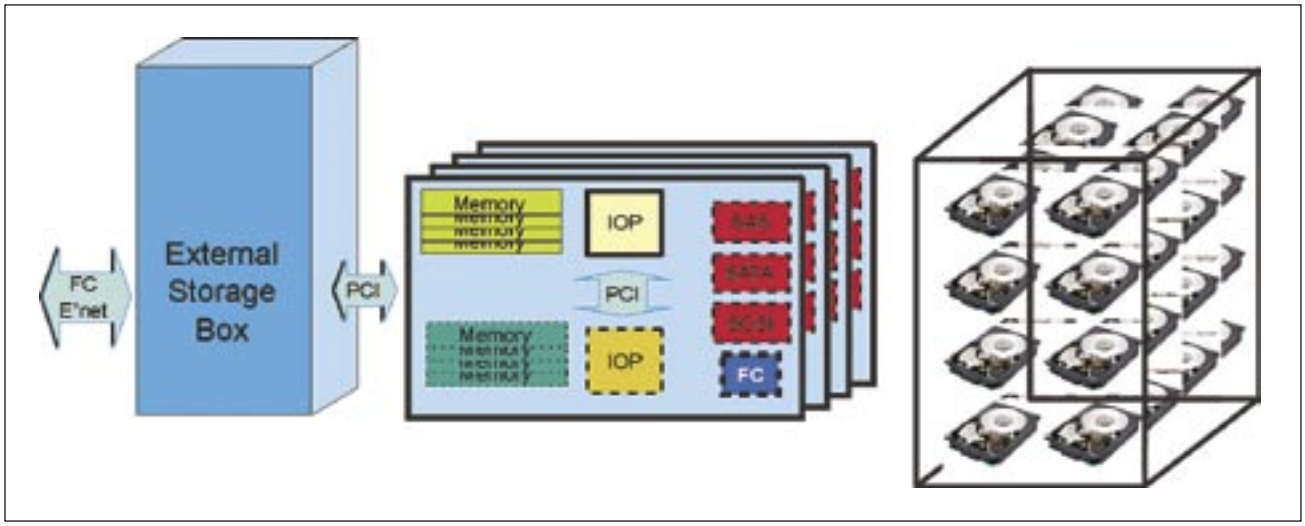

Figure 2

architecture of the embedded processor along with the L1/L2 cache sizes and speed.

To improve upon traditional storage approaches, AMCC provides various solutions to RAID control and protocol processing functions that offer increased design flexibility, higher bandwidth, and exceptional performance. AMCC's PowerPC product designed for IOP RAID control function is the PPC440SP (see Figure 3).

As mentioned previously, system designers must be conscious of bandwidth limitations in order to maintain storage subsystem performance. One such area of limitation on an IOP device involves the interfaces to the protocol processor and disk drive controllers. To combat potential limitation, the PPC440SP includes three PCI-X version 2.0 interfaces, which operate at double rated DDR for an effective DDR266 throughput. The primary bus (host bus) is a 64-bit interface with a maximum bandwidth of 2.13 GBps. The secondary (local) buses include one 64-bit interface (2.13 GBps) and one 32-bit interface (1.06 GBps).

Other possible bandwidth limitations are associated with the internal processor bus architecture. To address this, the internal bus of the PowerPC 440SP is a 128-bit Processor Local Bus (PLB), which provides a two-way crossbar with a separate 128-bit read and a 128-bit write data bus for each way. Each of the four 128-bit data buses can operate concurrently, providing up to 10.4 GBps of on-chip peak bandwidth at 166 MHz. An on-chip XOR accelerator unit performs the XOR functions needed to support RAID applications. These include parity generation and check functions that generate across data stripes in a RAID system.

Since PowerPC 440SP operates at up to 667 MHz and incorporates three PCI-X interfaces, a DDR II memory controller, an on-chip 10/100/1000Base-T controller, hardware DMA capability, an on-chip I2O messaging unit, and a rich peripheral mix, it is well suited for both host-attached and external RAID applications for DAS, NAS, and SAN storage subsystems.

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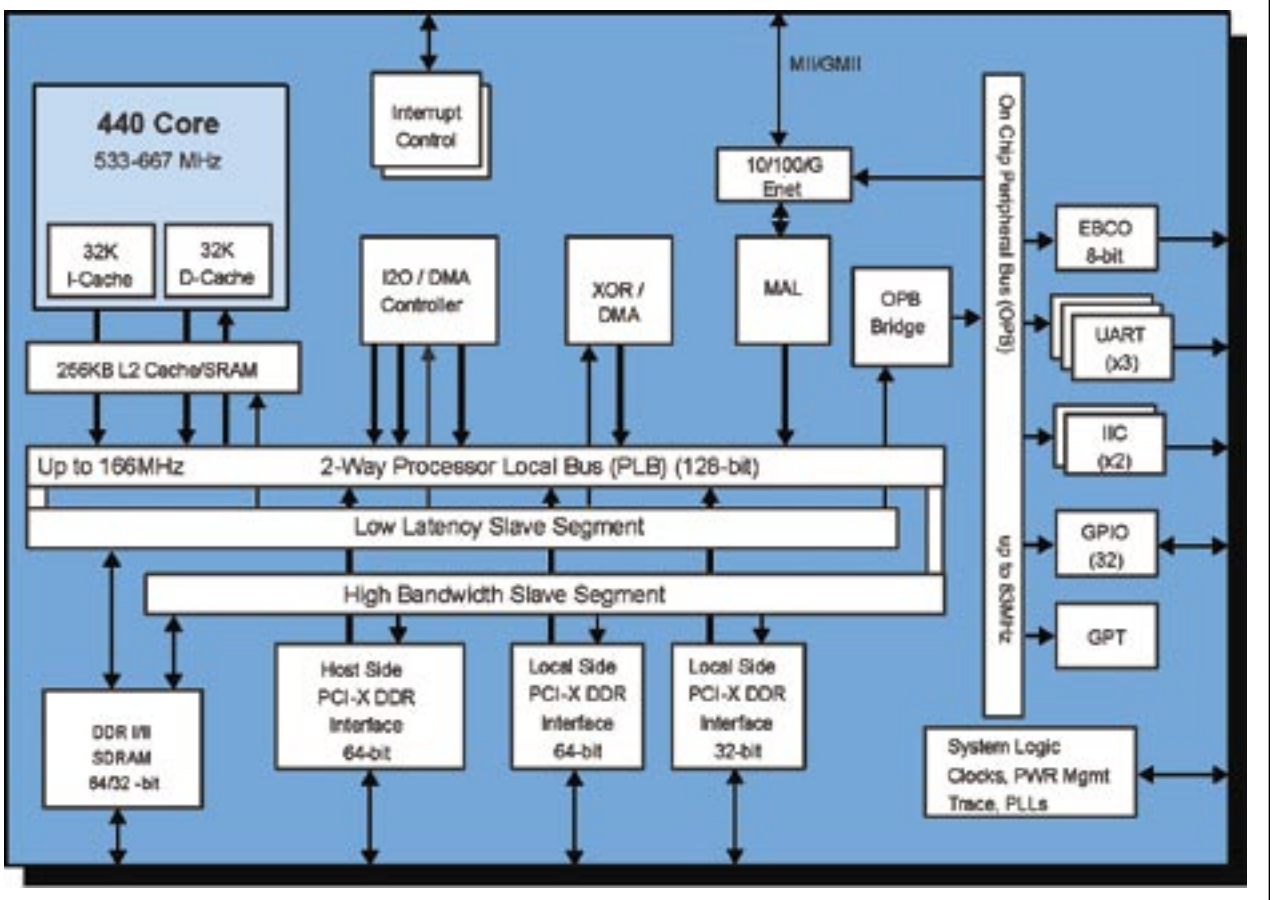

Figure 3

iscsiPCI-2GCx

FEATURES:

- Dual port GigE copper/fiber TCP/IP Offload Engine (TOE) adapter bundled with iSCSI software protocol
- Ensures no single point of failure on the storage transport layer between two nodes
- Offloads network protocol processing from the CPU
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- Carrier-grade feature class; fully compliant with IETF iSCSI standards

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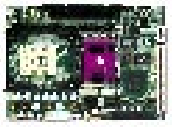

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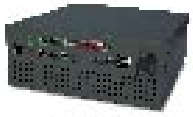

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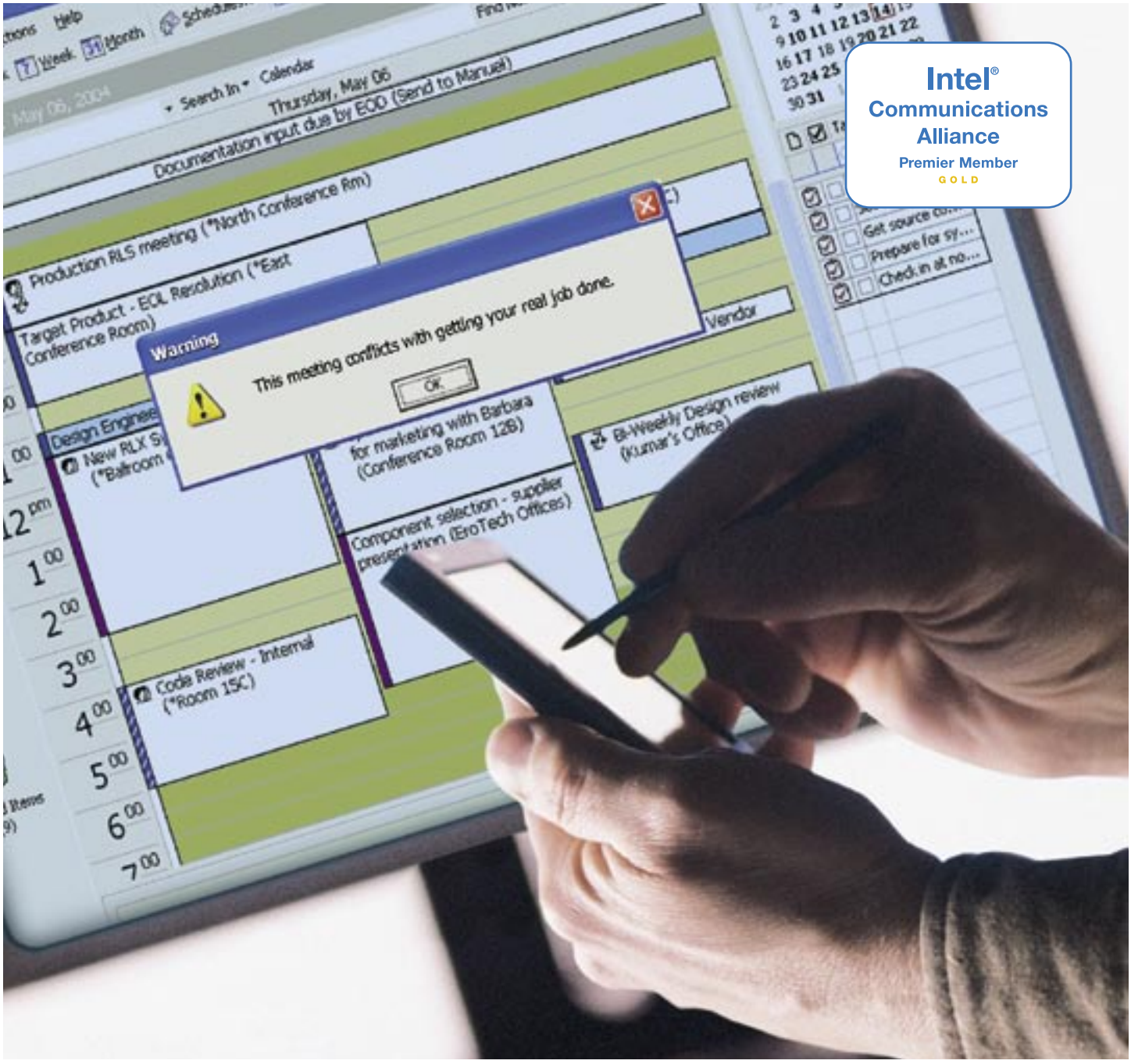

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